



Global Startup Ecosystem Report **2019**

with New Life Sciences Ecosystem Ranking

in partnership with  **hello
tomorrow**

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About Startup Genome



Startup Genome works to enhance startup success and ecosystem performance everywhere.

Our mission and impact are rooted in over a decade of independent research with data on over a million companies across 150 cities. Working side-by-side with more than 300 partner organizations, our frameworks and methodologies have become instrumental in building foundations for startups to grow. Our efforts earned us the Research Champions award at the Global Entrepreneurship Congress 2019.

Many of the world's leading governments and innovation-focused organizations have joined our knowledge network to cut through the complexities of startup ecosystem development and fuel sustained economic growth. Considered the new science of startup ecosystem assessment, we point to key gaps in startup ecosystems and prioritize actions to take in addressing them. Together with global thought leaders, we define robust strategies and implement programs to drive lasting change.

Join us and boost startup success, economic growth, and job creation in your region. Follow our work at startupgenome.com or find us at Facebook, Twitter, and LinkedIn.

About the Global Entrepreneurship Network



The Global Entrepreneurship Network (GEN) operates a platform of projects and programs in 170 countries aimed at making it easier for anyone, anywhere to start and scale a business. By fostering deeper cross-border collaboration and initiatives between entrepreneurs, investors, researchers, policymakers, and entrepreneurial support organizations, GEN works to fuel healthier start-and-scale ecosystems that create more jobs, educate individuals, accelerate innovation, and strengthen economic growth.

Our extensive footprint of national operations and global verticals in policy, research, and programs ensures members have uncommon access to the most relevant knowledge, networks, communities, and programs relative to size of economy, maturity of ecosystem, language, culture, geography, and more. We help celebrate, understand, support, and connect entrepreneurs and those who champion them.

Stay up-to-date on news and updates at genglobal.org.

Our Global Network



About Our Global Partners



A global non-profit organization on a mission to unlock the potential of deep technologies to solve the world's toughest challenges by highlighting, empowering and connecting the most promising deeptech entrepreneurs across the globe with the right enablers. They bring together a community of actors to facilitate collaboration between entrepreneurs, industries and investors in order to propel innovation from the lab to the market.

crunchbase

Everyday investors, journalists, founders, and the global business community turn to Crunchbase for information on startups and the people behind them.



Empowers ambitious tech entrepreneurs through growth programmes, digital entrepreneurship skills, a visa scheme for exceptional talent, and by championing the UK digital sector through data, stories and media campaigns.



Database of firmographics that provides company information on 50 million companies worldwide and powerful data matching capabilities to marketing software vendors and B2B marketing agencies.



Helps corporations, investment firms, and governments to track innovative companies and identify strategic opportunities, through data-driven software.

Note from a Founder

A new phase of Startup Genome: Action!

We're living through the transition to the Fourth Industrial Revolution, an era future historians may call the Great Transition. An era of great developments challenged by great paradoxes. It opens up new possibilities to solve global issues such as poverty and climate change, yet it is unsettling and creating great inequalities in its own right.

A separate phenomenon is the Global Startup Revolution — our community, a force that we, the big “WE”, have built together and can be used to do good. I strongly believe WE are the ones we've been waiting for!

It's all about community: while one needed to open a laptop to join the tech revolution, to join the Global Startup Revolution, one needs an ecosystem! Our research shows that more than 70% of the Success Factors

of a unicorn depend on the ecosystem — factors out of the control of the founders. That is humbling to me. As founders we play an important role, yes, but everyone in the community plays a role that is key to success. That calls us to be more inclusive and explicitly embrace diversity, women and minorities, and be grateful for everyone's contribution.

If you've been following us since 2011 you know that this is the big “WE” that we are part of and working for, to make startups more successful everywhere.

Our global startup community is now the #1 engine of job creation and economic growth, and the reason why large corporations and large capital no longer control R&D. Because we build success as communities, we have anchored certain behaviors such as “giving first” and giving stock options to every employee. This way, unlike the IPO of the previous revolutions, a tech IPO creates hundreds if not thousands of millionaires among its employees, with our culture calling each one to reinvest in the community as angel investors, VCs, mentors, and founders.

The Startup Revolution defines a global cultural movement where we share knowledge and favors, and invest in our communities knowing that the more we invest, the more we increase our individual and collective success. At Startup Genome, this is our mission.

The values of our Startup Revolution are our foundation. As always, we want to listen first: what are the values of your local startup community? Take part in the conversation, and share it here!

And come back to our website to see the results. We are reshaping our website to serve as an amplifier for your voices and a global window for your ecosystem's strengths and soft-landing connections for visitors. Contact us to contribute content to publish globally.

Finally, we are now driving Action! We have become the world's leading organization advising governments on innovation policy to increase startup success and accelerate ecosystem growth — in more than 25 countries and counting. We bring the best experts, thought leaders, and best-of-breed programs to unlock and accelerate ecosystem growth.

Our Global Startup Revolution is changing the world and we have our work cut out for ourselves: to make the Great Transition great for billions of people. Let's act!



JF Gauthier

Founder and CEO of Startup Genome

Foreword

The Rapid Rise of Flourishing Ecosystems Everywhere

Our mission at the Global Entrepreneurship Network (GEN) is to build — through programming in 170 countries and 80 GEN affiliate national operations — one global entrepreneurial ecosystem that makes it possible for anyone anywhere to start or scale a business. Our task is just as much about enabling healthier ecosystems as it is being there on the front lines with the world’s makers, doers and risk-takers.

We are especially proud that the 2019 Global Startup Ecosystem Report (GSER) — one of the most comprehensive pieces of research on what drives startup success and ecosystem performance — indicates progress toward this mission, showing a steep rise in success for startup ecosystems in more countries.

For a decade now, we have warned local leaders against “Silicon Silliness” — namely a strategy based on replicating Silicon Valley. For GEN, in order to build stronger ecosystems in more places, we have focused instead

on decentralized universality, working with all ecosystems to drive connectedness and enable the sharing of knowledge and networks.

That Silicon Valley, London, and New York City continue to lead all ecosystems in terms of size and performance is not counter to this mission. Quite the opposite. While they attract founders and talented employees and capital from around the world, the individuals and companies involved gain greater access to networks and resources that increase their chances for success. Further, concerns over “brain drain” and economic distance between regions have traditionally been addressed by putting up barriers. This new generation of advanced ecosystems outside the United States is showing what can be done when you focus on being a magnet.

The geographic spread of vibrant startup ecosystems is driven in part by technological opportunity, something

else we find in the 2019 GSER. A city does not need to excel in the same industry or sector as other places. GSER shows that technology has made it possible for regions to specialize in different startup sub-sectors, such as agri-tech, AI, or cleantech. Startups everywhere are experimenting with new business models to reinvent traditional industries — or create entirely new ones. Likewise, aligned public and private organizations are pioneering new integrated ways to support startups by focusing on certain sub-sectors.

At GEN we offer a compass for ecosystems to navigate the most efficient path to success. The launch this year, for example, of GEN Accelerates alongside the Entrepreneurship World Cup and GEN Starters Club offers every ecosystem an opportunity to compete with and learn from any other. GEN's Startup Huddle program enables nascent ecosystems build communities — one entrepreneur at a time. And our new eRegistration and eRegulation platforms offer less developed ecosystems an opportunity to leapfrog their peers with new solutions to managing the online relationship between governments and new business founders.

Through GEN's Global Business Angel Network, mature angel investor networks are mentoring investor ecosystems where there are none. Through Startup Nations, policymakers from new entrepreneurial economies are hacking effective programs and regulatory policies with

their peers thousands of miles away. And the Global Entrepreneurship Research Network, of which GSER is a member, is bringing new ways to crowdsource data collection and analysis around measuring ecosystem performance.

We thank Startup Genome and all our report partners for their excellent work on the 2019 Global Startup Ecosystem Report and for their important insights informing these programs. We urge all our national leadership teams and global communities to take note as we work together to level the playing field in the global entrepreneurial ecosystem.



Jonathan Ortman
President
Global Entrepreneurship Network (GEN)

Startup Genome Advisory Board

The Advisory Board is made up of leading ecosystem development experts from our Members across the world, with a mix of officials from different levels of government and leaders of public/private innovation and ecosystem development agencies.

North America

- United States, New York City — Justin Kreamer, Vice President of Partnerships, NYC Economic Development Corporation
- Canada, Montreal — Patrick Gagné, CEO of OSMO
- United States, Houston — Jon Nordby, Director of Strategy, Houston Exponential
- United States, Miami — Raul Moas, Director, Knight Foundation

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- The Netherlands — Coos Santing, Policy Advisor, Ministry of Economy
- Germany, Frankfurt — Thomas Funke, Co-Executive Director, TechQuartier
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- Taipei, Taiwan — Lewis Chen, Managing Director, Taiwan Tech Arena
- Singapore — Edwin Chow, Assistant CEO, Enterprise Singapore
- Singapore — Taufik Ahmed Farooq, Director of Innovation Infrastructure and Policy, Enterprise Singapore



State of the Global Startup Economy

The global startup economy continues to grow, creating \$2.8 trillion in value between 2016 and 2018.¹ This is a 20.6% increase from the previous period and more than double what it was just five years ago. This value creation is on par with a G7 economy and bigger than the annual GDP of the United Kingdom. Relatedly, 2018 saw a decade-high \$220 billion in total VC investments.

In 2012, Startup Genome, together with Steve Blank, published that “the writing was on the wall” for an economic revolution. We were in between two major economic eras, in the Great Transition from the Industrial to the Information Economy. Today, it’s clear this Great Transition has happened. In addition to the \$2.8 trillion in value created by just startups — excluding established tech companies — the list of large corporations are now dominated by tech. In 2008, only one of the 10 largest companies in the globe was technology-based: Microsoft. Today, it’s seven out of 10, and three of those are in Silicon Valley.

1. Measured from January 2016 to the first half of 2018.

Largest Global companies in 2018 vs 2008

2018				2008			
Rank	Company	Founded	USbn	Rank	Company	Founded	USbn
1.	Apple	1976	890	1.	PetroChina	1999	728
2.	Google	1998	768	2.	Exxon	1870	492
3.	Microsoft	1975	680	3.	General Electric	1892	358
4.	Amazon	1994	592	4.	China Mobile	1997	344
5.	Facebook	2004	545	5.	ICBC (China)	1984	336
6.	Tencent (China)	1998	526	6.	Gazprom(Russia)	1989	332
7.	Berkshire	1955	496	7.	Microsoft	1975	313
8.	Alibaba (China)	1999	488	8.	Royal Dutch Shell	1907	266
9.	J&J	1886	380	9.	Sinopec (China)	2000	257
10.	JP Morgan	1871	375	10.	AT&T	1885	238

Source: [Milford Assessment Management](#), from Bloomberg and Google

A few years ago, Startup Genome expected that the global startup economy would double in size every 10 to 15 years. As it turns out, that was an understatement.

In the midst of this massive growth, we see three major themes shaping the future for startup ecosystems.

#1 The Next 30

In the past decade a lot of the discussion about startup ecosystems has been centered on the question of who will be the next Silicon Valley.

There are many promising places. Today, there are five ecosystems that have as much VC funding in startups as Silicon Valley had in 1998 — the year Google was founded.² In addition to the five below, Los Angeles and Tel Aviv are not far behind.

- New York City
- London
- Beijing
- Boston
- Shanghai

In hindsight, it’s easy to see how these ecosystems have grown to the size Silicon Valley was then. It is also easy

2. Source for 1998 VC funding in Silicon Valley is Pitchbook, while the rest comes from the aggregated Startup Genome datasets.

to see how in 1998 Silicon Valley looked like an impossible-to-reach benchmark.

But we think the question of who will be the next Silicon Valley is a bit misguided, as it implies a new champion overshadowing the old one. We think the answer is different.

There Will Be No “Next Silicon Valley.” There Will Be 30

We think there will be no “next Silicon Valley.” Instead, there will be 30 “next” hubs, distributed around the world, reaching critical mass driven by either regional (e.g., Singapore in Southeast Asia) or Sub-Sector leadership (e.g., San Diego in Life Sciences).

While none of them will be as big as Silicon Valley in the foreseeable future, each will thrive.

“Instead of one new center or two new centers (of entrepreneurship, besides Silicon Valley), there will be 30, and there will be clusters in different places that don’t quite get to the density of the Bay Area but get beyond critical mass.”

Sam Altman, Y Combinator and OpenAI

So who will the Next 30 be? We cannot know exactly, but we have some clues.

Top 30 Global Startup Ecosystems



	Ranking	Change from 2017
Silicon Valley	1	0
New York City	2	0
London	3-4	0
Beijing		▲ 1
Boston	5	0
Tel Aviv		0
Los Angeles	6-7	▲ 3
Shanghai	8	0
Paris	9	▲ 2
Berlin	10	▼ -3
Stockholm	11	▲ 3
Seattle	12	▼ -2
Toronto-Waterloo	13	▲ 3
Singapore	14	▼ -2
Amsterdam-StartupDelta	15	▲ 4
Austin	16	▼ -3
Chicago	17	▲ 1
Bangalore	18	▲ 2
Washington, D.C.	19	NEW
San Diego	20	NEW
Denver-Boulder	21	NEW
Lausanne-Bern-Geneva	22	NEW
Sydney	23	▼ -6
Vancouver	24	▼ -9
Hong Kong	25	NEW
26-30 in alphabetical order		
Atlanta	26-30	NEW
Barcelona		NEW
Dublin		NEW
Miami		NEW
Munich		NEW

The top 30 global startup ecosystems of today are a good place to start. But they are not the only ones, and they should not feel safe in their position at the top. There is considerable movement among them, and some ecosystems outside the top 30 have a real shot of making the list in the future — we call them Challenger ecosystems. This report covers trends about these places in more detail in the Overall Rankings section.

Challenger Startup Ecosystems

Startup Genome

	Country	Continent
Greater Helsinki	Finland	Europe
Hangzhou	China	Asia-Pacific
Jakarta	Indonesia	Asia-Pacific
Lagos	Nigeria	Africa
Melbourne	Australia	Asia-Pacific
Montreal	Canada	North America
Moscow	Russia	Europe
Mumbai	India	Asia-Pacific
São Paulo	Brazil	South America
Seoul	Korea	Asia-Pacific
Shenzhen	China	Asia-Pacific
Tokyo	Japan	Asia-Pacific

Beyond the Next 30 and the \$4 Billion Barrier

In 1964, Roger Bannister became famous as the first person to ever run a 4-minute mile — breaking a barrier that had stood for decades and many thought humanly impossible to reach. Once he showed it could be done, the same barrier was broken by John Landy, an Australian runner, only 46 days later. And as Bill Taylor relates in a Harvard Business Review article, just a year later three runners broke the barrier in the same race.³

Once Bannister showed the possibility, that level of performance that had never been done for decades became achievable. Since then, over 1,000 runners have completed a 4-minute mile.

As more cities around the globe become viable startup ecosystems, we think a similar thing might be happening.

Between 2014 and 2016, 29 ecosystems created over \$4 billion in Ecosystem Value. Today, between 2016 and 2018, there are 46 ecosystems creating that level of economic impact through their startups. Interestingly, we were able to identify **fewer than 15 startup ecosystems** at that level of performance in 2012.

While historical data on this is tricky, it is hard to imagine more than a few startup ecosystems creating that level of Ecosystem Value in the 1990s. As Pitchbook data shows, Boston had about \$900 million in VC investments in 1998, New York City had \$800 million, and both Seattle and London had only about \$200 million in investments in the same year.

By definition, the list of top startup ecosystems will always be limited. But what this \$4 billion barrier in Ecosystem Value shows is that many places, all over the globe, have a real shot at building thriving, local startup economies.

We predict about 100 cities will cross the \$4 billion threshold in Ecosystem Value in the next 10 years. Many of those are covered in this report.

3. <https://hbr.org/2018/03/what-breaking-the-4-minute-mile-taught-us-about-the-limits-of-conventional-thinking>

#2 Deep Tech Rising

While the whole startup economy is growing, some parts are growing faster than others. One area growing particularly rapidly is Deep Tech — sub-sectors that require tangible IP to succeed, like Life Sciences, Robotics, and AI.⁴

We see this trend in a few different ways. **Nearly half (45%) of startups being created globally now are in Deep Tech-related sub-sectors — twice the share they made up in 2010-2011.**⁵ Moreover, the four fastest growing startup sub-sectors are all Deep Tech-related.

Top 4 fastest-growing startup sub-sectors

Early-Stage Funding Deals over 5-Years (Seed + Series A)

- #1 Advanced Manufacturing & Robotics (107.9%)
- #2 Blockchain (101.5%)
- #3 Agtech & New Food (88.8%)
- #4 Artificial Intelligence, Big Data & Analytics (64.5%)

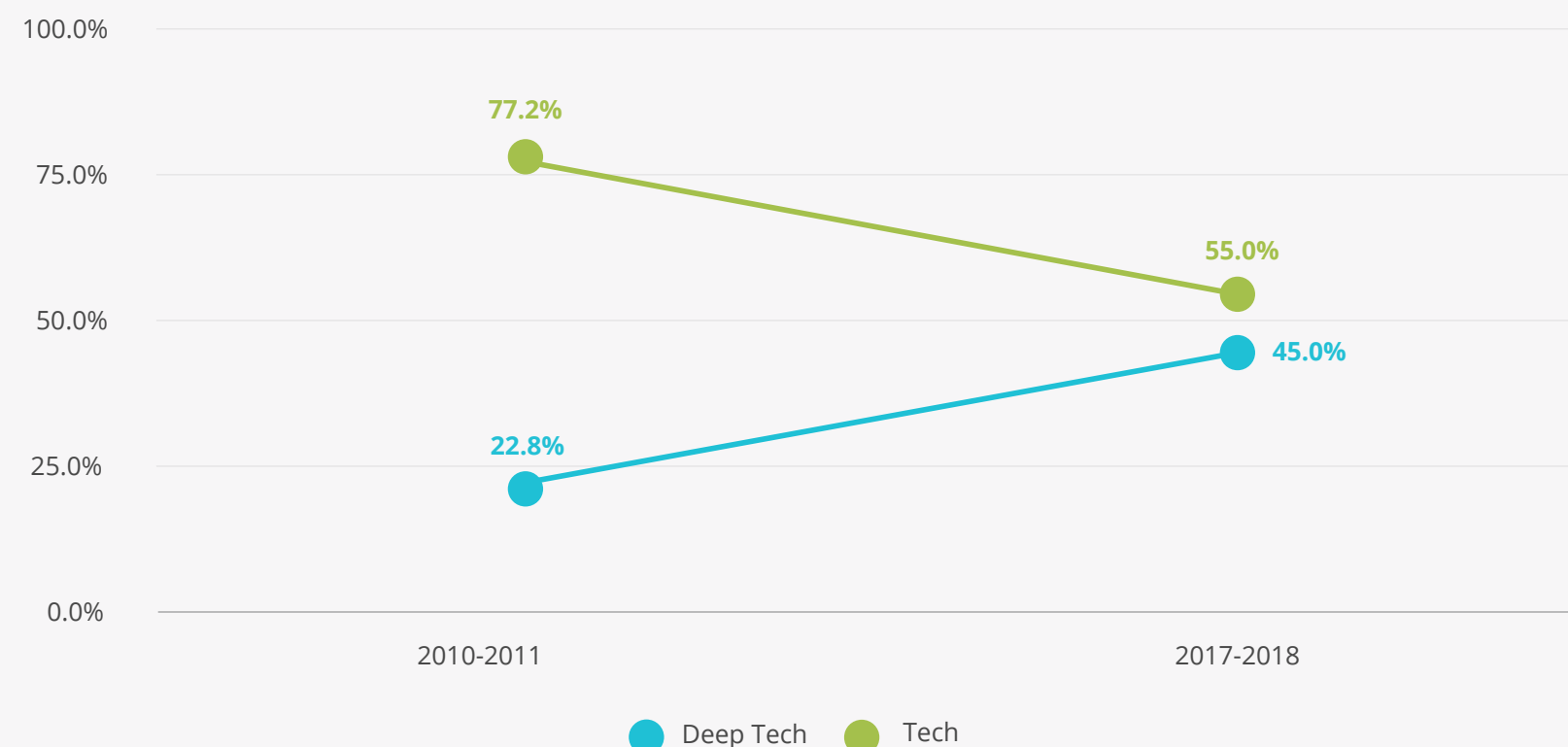
4. Here, we define Deep Tech-related sub-sectors as AI, Blockchain, Life Sciences, Advanced Manufacturing & Robotics, Agtech & New Food, and Cleantech; other Tech sub-sectors as Fintech, Cybersecurity, Edtech, Gaming, Adtech, Digital Media. For more details on our algorithm to classify companies into these sub-sectors please see our Methodology section.

5. Calculated based on 165,000 startups created in the period that our machine learning algorithm classified into one of the 12 startup sub-sectors, listed in the Methodology section.

Today, 45% of startups created are in Deep Tech-related sub-sectors, compared to only 22.8% in 2010-2011

Share of startups created, 2010-2011 vs 2017-2018

Startup Genome



“The next Bill Gates will not start an operating system. The next Larry Page won’t start a search engine. The next Mark Zuckerberg won’t start a social network company.”

Peter Thiel, Founders Fund

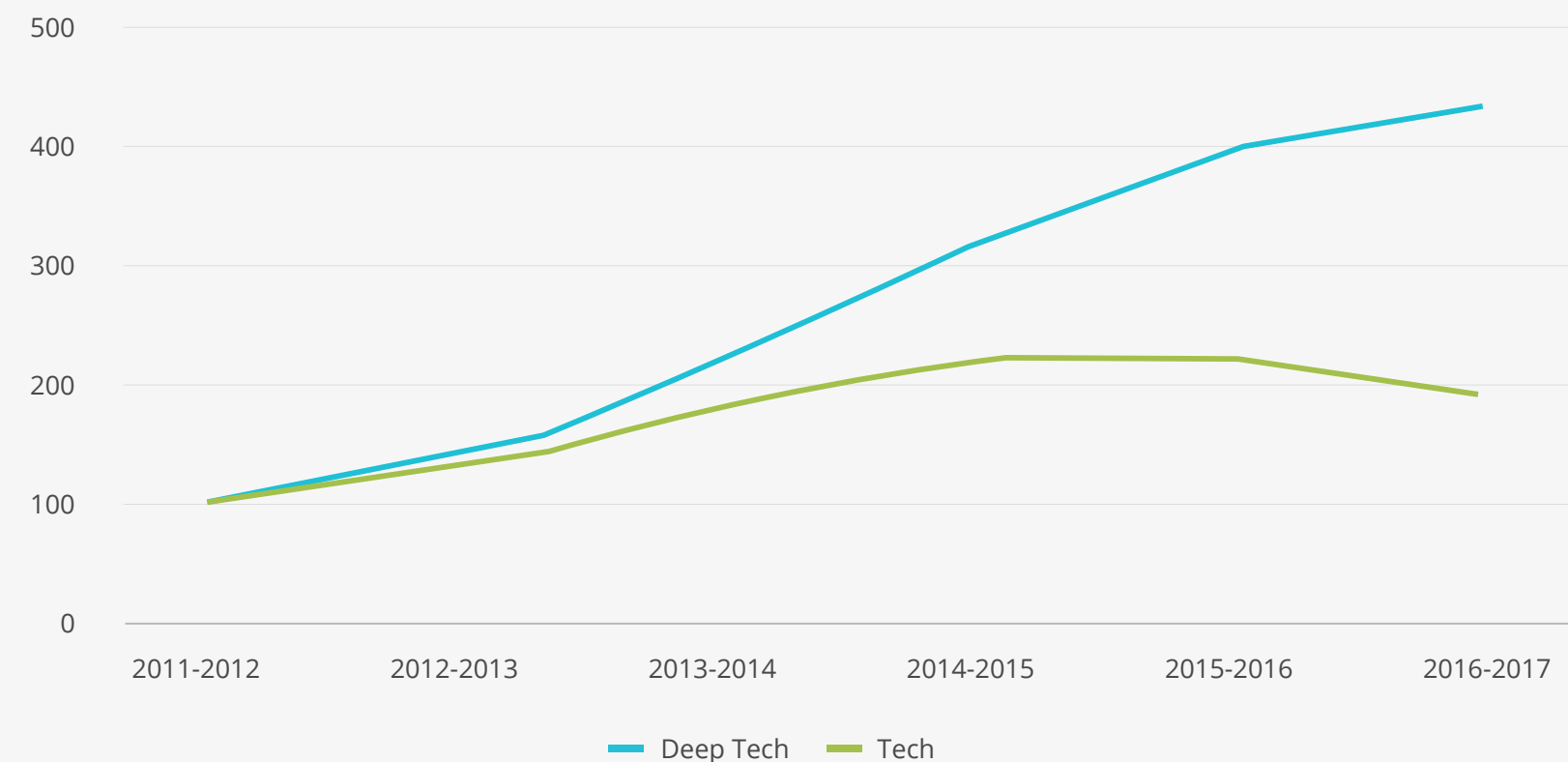
To paraphrase Peter Thiel, the next Silicon Valley will not be like Silicon Valley — just like the next Mark Zuckerberg will not be like Mark Zuckerberg. While the reigning generation of tech ecosystems came largely from innovations in silicon microchips and the internet, the next 30 will start from that foundation but ultimately grow from completely different innovations. Deep Tech will be a key part of that.

The rise of Deep Tech provides a real opportunity for ecosystems to grow based on their existing strengths. Places that would not be anywhere close to the top ecosystems in software have the potential to build a thriving startup economy leveraging their universities, research capacity, and traditional economy strengths. For instance, while Lausanne-Bern-Geneva, San Diego, and Munich are not among the best software startup producers, they all made it into the top 30 global startup ecosystems thanks to their performance in Deep Tech and Life Sciences factors. Other ecosystems like Seoul and Tokyo — both massive patent creators — are Challenger ecosystems with a real chance of being part of the top 30 ecosystems of the future.

Deep Tech-related Startup Sub-Sectors have increased Early-Stage Funding by 4x since 2011-2012, more than twice as much as other Tech Sub-Sectors

Early-Stage Funding by Sub-Sector, 2-year moving averages indexed. 2011-2012 = 100

Startup Genome



#3 Unprecedented Wealth and Continued Disparity

While there are unprecedented levels of wealth created by the global startup economy, the opportunity to participate in it is far from evenly distributed. The tech economy leads in wealth and job creation. It might also lead in disparity creation.

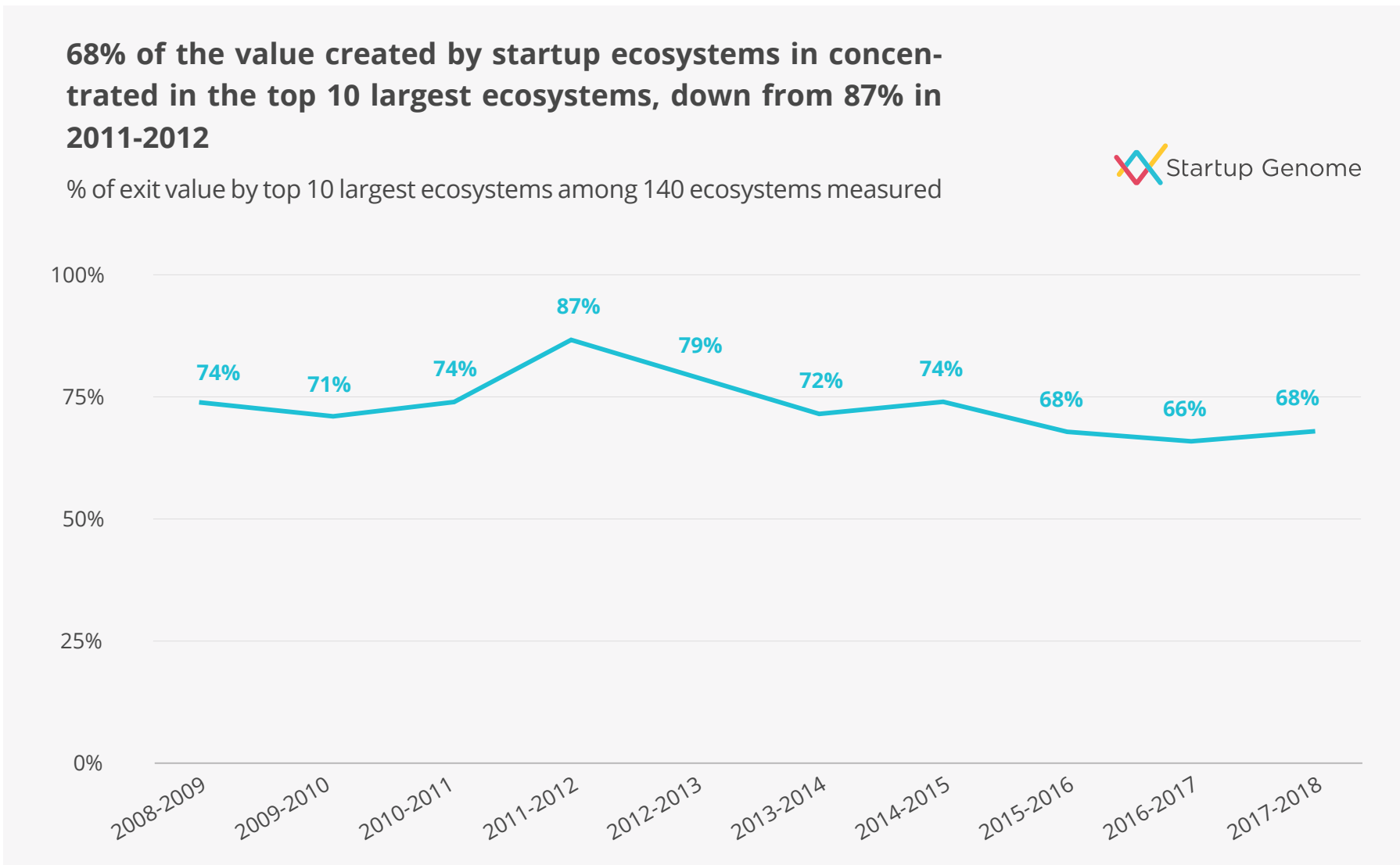
Geographic Concentration

The first major way this value creation is not distributed is geographic. Many regions are falling behind.

Over two-thirds (68%) of tech exit value is created and captured by the top 10 cities globally. This concentration, however, appears to be declining: it was 87% in 2011-2012.

Even in Top Ecosystems, Not All Get the Opportunity to Participate

The second major way that wealth creation is not evenly distributed is within ecosystems. Even in the places creating the largest value for the tech economy, most people living there don't necessarily get to fully participate. As some observers have said before, Silicon Valley might be the only place in the world where you can see a homeless person sitting outside a billion-dollar tech company's office.



One way we measure this disparity is through looking at the kind of people that become founders. The record on inclusion is not very promising.

For instance, globally, only 14.1% of tech founders are female in the average ecosystem. And, in none of the 80+ ecosystems we measured this for do women make

up half of the founders.

Perhaps more interestingly, **only three ecosystems crack the top 10 in both female entrepreneurship and global performance: New York, Los Angeles, and Shanghai.**

Chicago, a top 20 global ecosystem, leads the way in female entrepreneurship together with the Mid-East Region of Ireland, both with over 25% of female founders

Gender is of course only one way of looking at this. Race and socio-economic background are others, and both are things Startup Genome works on measuring and improving with our Member ecosystems. Sadly Silicon Valley, the world’s leading ecosystem, does not have an impressive track record on these and other measures of inclusion either. For instance, while Latinos make up almost 30% of the population in San Jose, the metropolitan area in the heart of Silicon Valley, the region is at the bottom of the list for Latino entrepreneurship, as research from Stanford University and our own research director shows.⁶

6. Morelix, Tareque, Orozco, Perez, Oyer, and Porras; The U.S. Latino Entrepreneurship Gap, (Stanford University Graduate School of Business, 2018)

Top 10 ecosystems with largest share of female founders

 Startup Genome	% of female founders
Chicago	25%+
Mid-East Region, Ireland	25%+
New York City	22-24%
Shanghai	22-24%
Houston	20%
Sydney	19%
Miami	19%
Los Angeles	18%
Bahrain	18%
Busan	18%

Percent of female founders among top 15 global startup ecosystems

 Startup Genome	Global Ecosystem Ranking	% of female founders
Silicon Valley	1	16%
New York City	2	22-24%
London	3-4	15%
Beijing	3-4	16%
Boston	5	14%
Tel Aviv	6-7	9%
Los Angeles	6-7	18%
Shanghai	8	22-24%
Paris	9	8%
Berlin	10	9%
Stockholm	11	16%
Seattle	12	8%
Toronto-Waterloo	13	16%
Singapore	14	13%
Amsterdam-StartupDelta	15	12%

Techlash and Tech Responsibility

With many places and people falling behind, our society is paying the price: economic, political, and human.

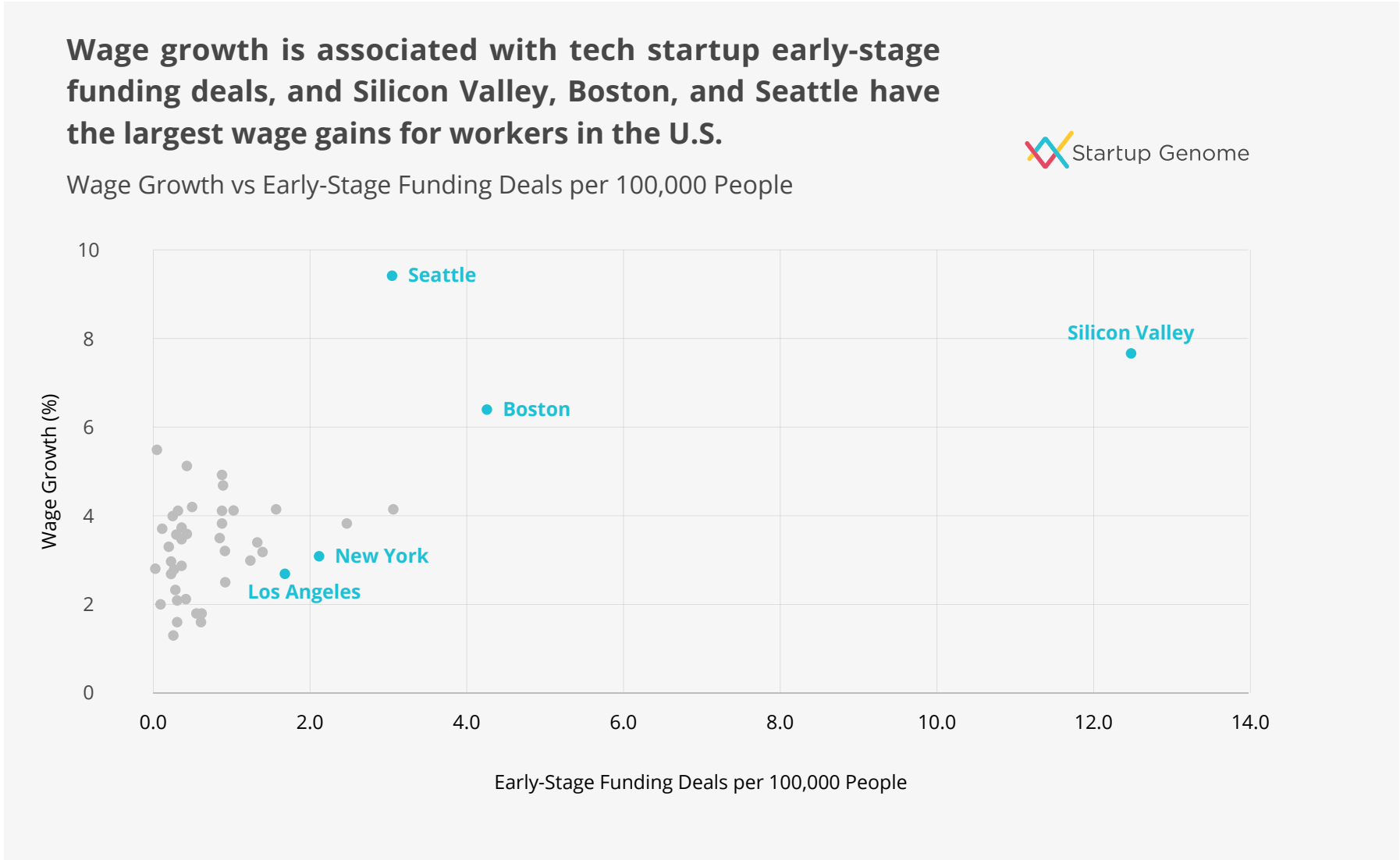
Around the world there is real fear of job displacement by automation. The regions and people not feeling included economically are fueling many populist political movements. As Anne Case and Angus Deaton, a Nobel laureate, have documented, we have even seen a rise in “deaths of despair” — by suicides and drug abuse-related — among the groups most affected by economic blight in the United States.

Understandably, there is a “techlash” happening. But less innovation is obviously not the answer, and trying to stop tech from progressing today would not be too different from trying to stop steam engines in the Industrial Revolution.

Entrepreneurs create jobs, wealth, and innovation — and are a global force for good.

As research from the Kauffman Foundation and others have extensively documented, most net new jobs come from startups and scaleups.^{7 8 9}

Our own recent work with Inc. magazine on Surge Cities in the United States has also demonstrated the relationship between wage growth for workers and tech entrepreneurship. Seattle, Silicon Valley, and Boston



lead the country in wage gains for workers — all among the top 15 global startup ecosystems.

Tech went from a small number of misfits and upstarts to become a major power in the global economy. It is up to us, the collective of startup ecosystems in the world, from Amsterdam to Jakarta, to live up to the responsibility that this growing power means.

- 7. Haltiwanger, Jarmin, and Miranda; Who Creates Jobs? Small Versus Large Versus Young, (The Review of Economics and Statistics, 2013)
- 8. Davila, Foster, He, and Shimizu; The Rise and Fall of Startups: Creation and Destruction of Revenue and Jobs by Young Companies, (Stanford University Graduate School of Business, 2015)
- 9. Wiens and Jackson; The Importance of Young Firms for Economic Growth, (Ewing Marion Kauffman Foundation, 2015)

Why Startups Succeed or Fail

Building a successful business is every entrepreneur's goal — but only 1 in 12 succeed in doing so.

Startup Science built an integral, whole systems model of a startup, synthesizing wisdom, learnings and frameworks from many of the top experts in the field to figure out what differentiated the successes from the failures. Over the years, they gathered and analyzed a comprehensive data set on over 34,000 companies to test and iterate their maps and models. Here are some of their primary insights, learnings and discoveries:

One of the most important principles successful companies possess is: Balance. Creating a successful startup is a balancing act amongst many variables simultaneously often amidst environments of extreme uncertainty and volatility. One of the most important balancing acts is between The Inner Dimensions and The Outer Dimensions of a startup. The Outer Dimensions are most

Stages of the Startup Science Lifecycle

1
Discovery

Achieve Problem/Solution Fit: confirm whether they are solving a meaningful problem.

2
Validation

Achieve Product/Market Fit: confirm through qualitative and quantitative metrics that their product has a real passionate early adopter user base that loves what they're building

3
Efficiency

Prepare the company for scaling by optimizing a long conversion funnel beginning from first customer contact; refine the business model, culture and financing plans.

4
Scale

Step on the gas pedal and aggressively drive growth and scale organizational capacity

5
Sustain

6
Maintain

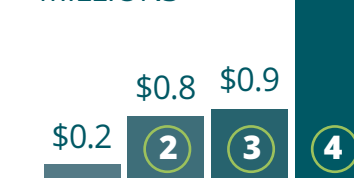
7
Decline

Not assessed in this graphic

succinctly summarized by Traction — [Users, Customers, Product Usage and Revenue]. The Inner Dimensions are Five Fold: Customer Relationship, Product, Team, Finance and Legal.

Startup Science discovered that **the primary reason startups fail is that their Inner Dimensions get ahead of their Outer Dimensions**, which they call **Premature Scaling**.

Funds Raised by Stage



Latest Month's User Growth by Stage



Cumulative Months Worked by Stage



Numbers of Employees by Stage



Companies that scale prematurely are classified as **inconsistent**

Companies that scale properly are classified as **consistent**

Average Funding Raised

Inconsistent Companies

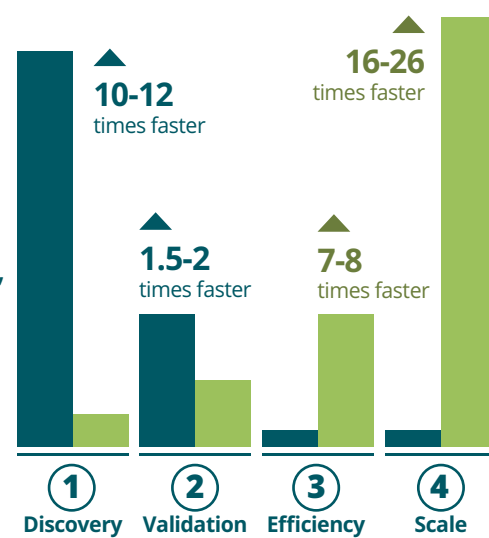
\$1,100,000

Consistent Companies

\$3,400,000

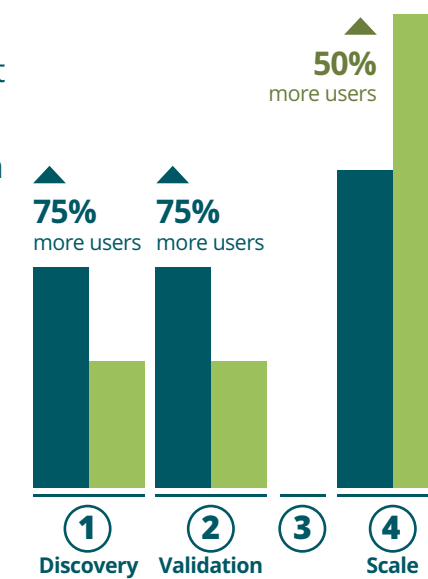
User Growth

Inconsistent start-ups grow 10-12 times faster in Discovery stage, 1.5-2 times faster in Validation stage, 7-8 times slower in Efficiency stages and 16-26 times slower in Scale stage.



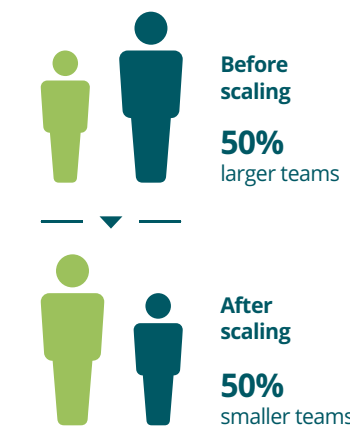
Users (paid)

Enterprise startups that scale prematurely have 75% more paid users in Discovery and Validation stages compared to consistent startups. Consistent startups have 50% more paid users in the Scale stage than inconsistent startups.



Team size

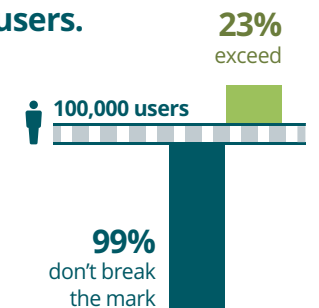
Inconsistent startups have 50% larger teams before scaling and 50% smaller teams after scaling.



Users (free)

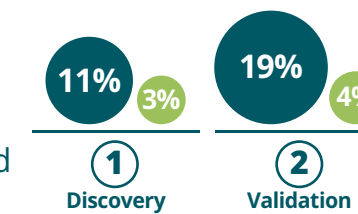
23% of consistent start-ups exceed 100,000 users.

99% of consumer focused startups that scale prematurely stay below 100,000 users.



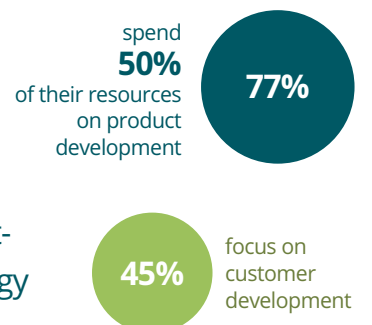
Outsourcing

On average, inconsistent startups outsourced 11% of product development in Discovery and 19% in Validation. Consistent startups outsourced 3 to 4%.



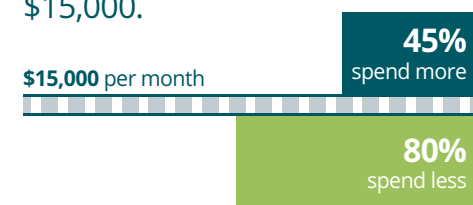
Focus in the Discovery Phase

70% of startups that scale prematurely focus 50% or more of their resources in Discovery stage on product development. 45% of consistent startups focus their energy on customer development.



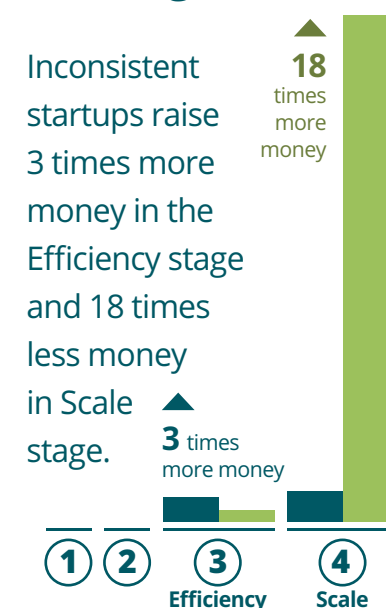
Customer acquisition

45% of startups that scale prematurely spend more than \$15,000 per month on customer acquisition before optimizing their conversion funnels & acquisition costs. 80% of consistent startups spend less than \$15,000.



Funding

Inconsistent startups raise 3 times more money in the Efficiency stage and 18 times less money in Scale stage.



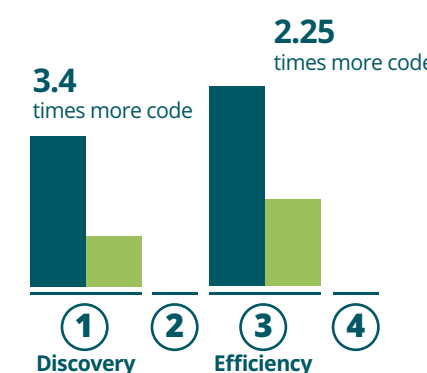
A sign of premature scale: Perfectionism

- too much focus on scalability
- building nice-to-have features
- too little user testing

\$10 Million

The self-reported valuation of inconsistent startups before entering Scale stage. Consistent startups report \$800,000

Lines of Code Written



Inconsistent startups write 3.4 times more lines of code in the Discovery stage and 2.25 times more lines of code in the Efficiency stage.

This infographic is based on the widely recognized research of the Startup Genome project that was started by Bjoern Lasse Herrmann and Max Marmer in 2010. In 2018 Bjoern and Max decided to continue the Startup Genome research under the name Startup Science. The purpose of this new project is to advance the original work and to contribute to laying the foundations for a comprehensive paradigm for the Management Science of Entrepreneurship and Innovation.

If you're interested to learn more please [sign up for our mailing list here](#).

Read more on [patterns of successful internet startups here](#).

Read more on [premature scaling here](#).

How Public Policy Action Supports Startups

Key Findings

- Efforts to expand funding for startups are the number one most common policy action taken by governments.
- In the aggregate, policy actions to increase access to capital are correlated with greater levels of early-stage funding in ecosystems.
- After access to finance, the next most common policy action are SSOP Support and Immigration.
- While policy actions have been taken by governments across a wide array of categories, the areas with the least action taken are Bankruptcy, Diversity & Inclusion, and Procurement.

Global Landscape for Startup Policy

What policy actions are countries and regions taking to support startup ecosystems? And what impact are those actions having?

As part of Startup Genome's first-ever global policy audit — and in collaboration with our partner, the Global Entrepreneurship Network (GEN) — we offer some answers to those questions.

There are already some existing measures of how the policy environment affects startups. Such measures score countries on indicators such as property rights, macroeconomics, innovation, intellectual property, and so on. The World Economic Forum's Global Competitiveness Report, for example, is a useful starting point to see how countries stand in relation to each other. Likewise, the World Bank's Doing Business indicators convey not only the current state of business regulation but also the direction that countries are moving. The Doing Business results show what countries have made reforms in areas like business registration and paying taxes. This is useful for directional comparison.

When it comes to public policy and startup ecosystems,

however, there are two main dimensions missing from the present state of global policy comparisons. Both pertain to policy action. Entrepreneurs, investors, corporate executives, policymakers, and others want to know the answers to these questions:

- Who is doing what to improve their startup ecosystem?
- Are those actions actually improving the startup ecosystem?

This is what Startup Genome is attempting to create. First, a policy audit across countries and regions: who is taking action and in what areas? Second, are those actions actually effective in raising the performance of the startup ecosystem?

What Actions Are Governments Taking?

Through interviews and secondary research, we canvassed entrepreneurship-focused policy actions across dozens of countries and regions. We classified these actions into 15 categories of policy action — the table below shows the distribution of policy actions by frequency or intensity.¹ The most policy actions were done in efforts to expand funding or access to capital for startups (dark blue), followed by Startup Support Organizations and Programs (SSOPs) Support and Immigration.² Areas with the least policy action (light blue) include bankruptcy and procurement.

Policy Action Taken	Intensity of Actions
Funding/Access to Capital	
SSOP Support	
Immigration	
Go-Global Support	
Entrepreneurship Education	
Taxes	
Univ. Commercialization	
Cultural Support	
Regulatory Sandbox	
Scaleup Support	
Entrep. In Residence	
Regulatory Reform	
Procurement	
Diversity & Inclusion	
Bankruptcy	

Examples of policy actions on funding include Australia’s early-stage investment tax credit, the Al Waha Fund of Funds in Bahrain, and the massive startup investments made by French state bank, Bpifrance. Examples of policy action on immigration include the Global Talent

Scheme in Australia and the startup visas now offered by many countries.

This global policy audit is not yet complete, and as we collect more information, we expect the distribution to shift. But some preliminary observations are in order:

- The distribution of policy actions is not altogether surprising: it is more straightforward to allocate public money into a funding program than it is to change the complicated area of bankruptcy.
- Given the increasing focus on diversity and inclusion in startup communities (or the lack thereof), we are surprised that we didn’t find more overt policy actions here.
- The areas with the least amount of policy actions point to potential areas of comparative advantage for countries and regions. If most of the focus is on access to finance and SSOPs and immigration, maybe some ecosystems can strengthen their ecosystems (and increase their global and regional attraction) by distinguishing themselves with bankruptcy reform or a program for scaleups.

1. By frequency, we mean number of actions. By intensity, we mean the amount of resources dedicated to something. A more complete analysis will be published later in 2019.
2. SSOP = startup support organization or program.

What Impact Do Policy Actions Have for Startups?

In next year’s Global Startup Ecosystem Report (GSER), we will compare policy action to ecosystem performance. This year, preliminarily, we looked at existing data on public policy and analyzed it in relation to Startup Genome’s latest ecosystem assessments.

Empirical scoring on public policy is not only difficult but also rare. It’s not easy, prospectively, to judge the impact or wisdom of policy actions, whether large or small. It’s even more difficult, retrospectively, to declare that this policy unambiguously created that outcome. Analysis becomes even more complex when governments institute a raft of policies simultaneously, even if they are rhetorically aimed at one objective — namely, entrepreneurship.

In 2013, two developments occurred related to entrepreneurship policy in Europe. Encouraged by the European Commission (EC), the Startup Europe Leaders Club released a Startup Manifesto for Europe. This contained a list of actions that European Union countries could do to better support startups. Meanwhile, the EC released its own Entrepreneurship 2020 Action Plan, containing recommendations for member countries. Three years later, in 2016, the European Digital Forum released The 2016 Startup Nation Scoreboard, an update on policy-making progress for entrepreneurship in Europe.³

This gives us a way to look at how policy changes over a period of several years might be influencing the state of startup ecosystems in Europe. More precisely, we can use Startup Genome’s 2018-19 ecosystem performance scores, giving us a time lag to account for policy implementation. Interestingly, the policy scores are based on the inputs of a large group of “experts” rather than any sort of impact evaluation. This means we are judging a crowd-based opinion of progress toward policy objectives with subsequent performance of startup ecosystems.

There are some limitations to this analysis. First, it only pertains to Europe. We hope to develop a consistent comparative mechanism for cross-country policy in the

near future. Second, we do not yet have historical data to track changes in ecosystem performance over time across our entire dataset. This limitation is mitigated somewhat by the fact that our ecosystem performance scores are comparative: how is one ecosystem doing against others? And, to account for lags in data and error corrections, our datasets cover 12- to 30-month time periods.⁴

Overall, as shown in Figure 1, there is a slightly positive relationship between a country’s adoption rate of Startup Manifesto policy recommendations and the subsequent performance of a country’s main ecosystem. (The average adoption rate across countries was 60%.)

3. David Osimo and the Startup Manifesto Policy Tracker Crowdsourcing Community, The 2016 Startup Nation Scoreboard, European Digital Forum.

4. The policy scores pertain to countries while our performance scores measure individual ecosystems. Where we have multiple ecosystems in a country, we averaged the performance scores across them for a country-level score. We also compare country-level policy scores to the performance of the main ecosystem in each country. The unit of analysis is indicated in each chart.

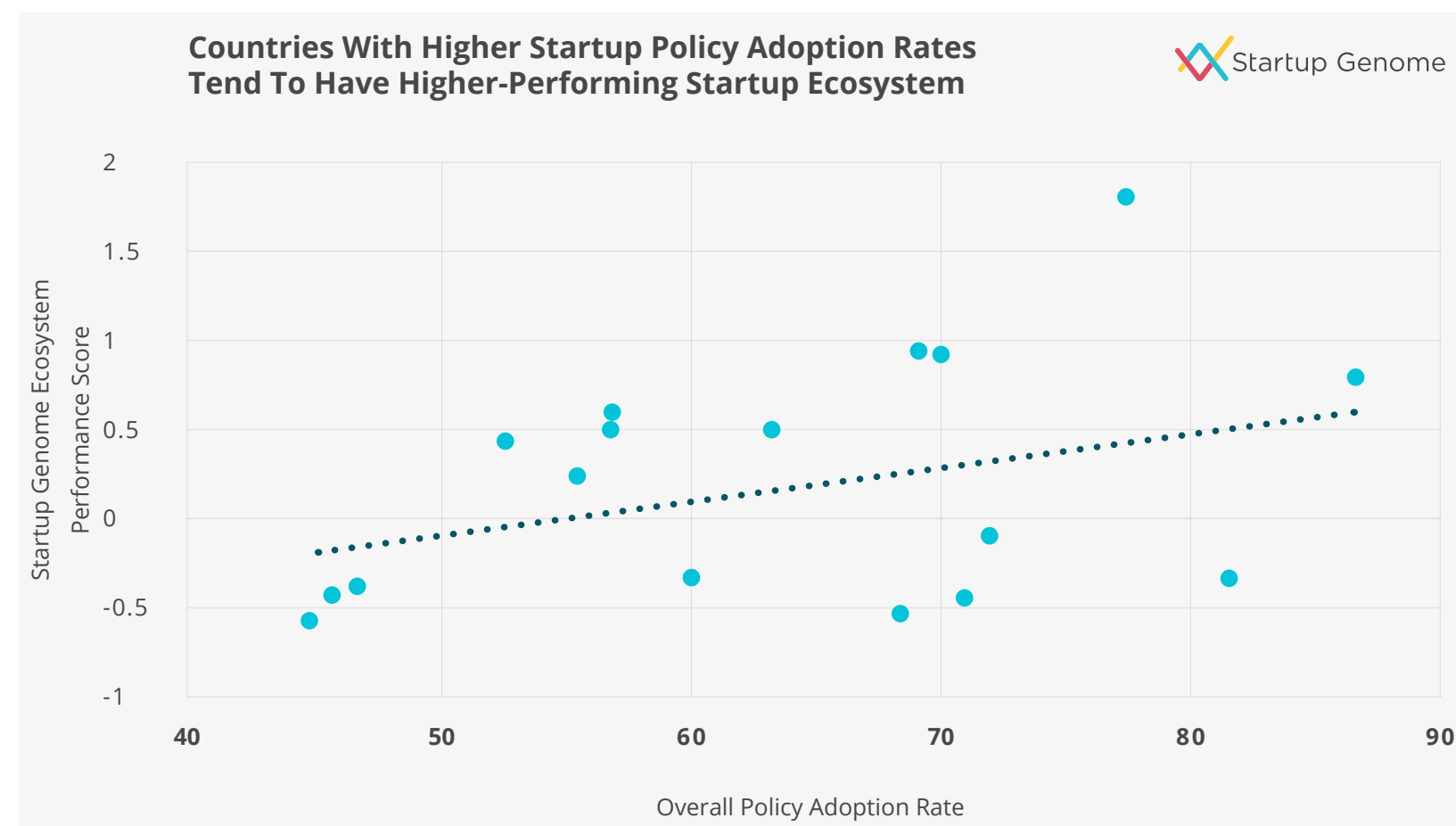


Figure 1. Sources: Startup Genome analysis; 2016 Startup Nation Scorecard.

Intriguingly, there are outliers: some countries with high adoption rates (over 70%) had low ecosystem performance scores. Some with adoption rates under 60% have high-performing ecosystems. In Figure 2, we look at the relationship between ecosystem performance and the overall grade given to countries. Strikingly, one country with the highest grade for policy adoption had the lowest ecosystem performance score in our analysis! This chart makes it clear that there is not necessarily a one-to-one relationship between policy and ecosystem performance.

The European policy scorecard also rates countries on actions taken in individual policy pillars. These are:

- Institutional Framework
- Skills & Education
- Access to Talent
- Access to Capital
- Thought Leadership

When we compare ecosystem performance scores to

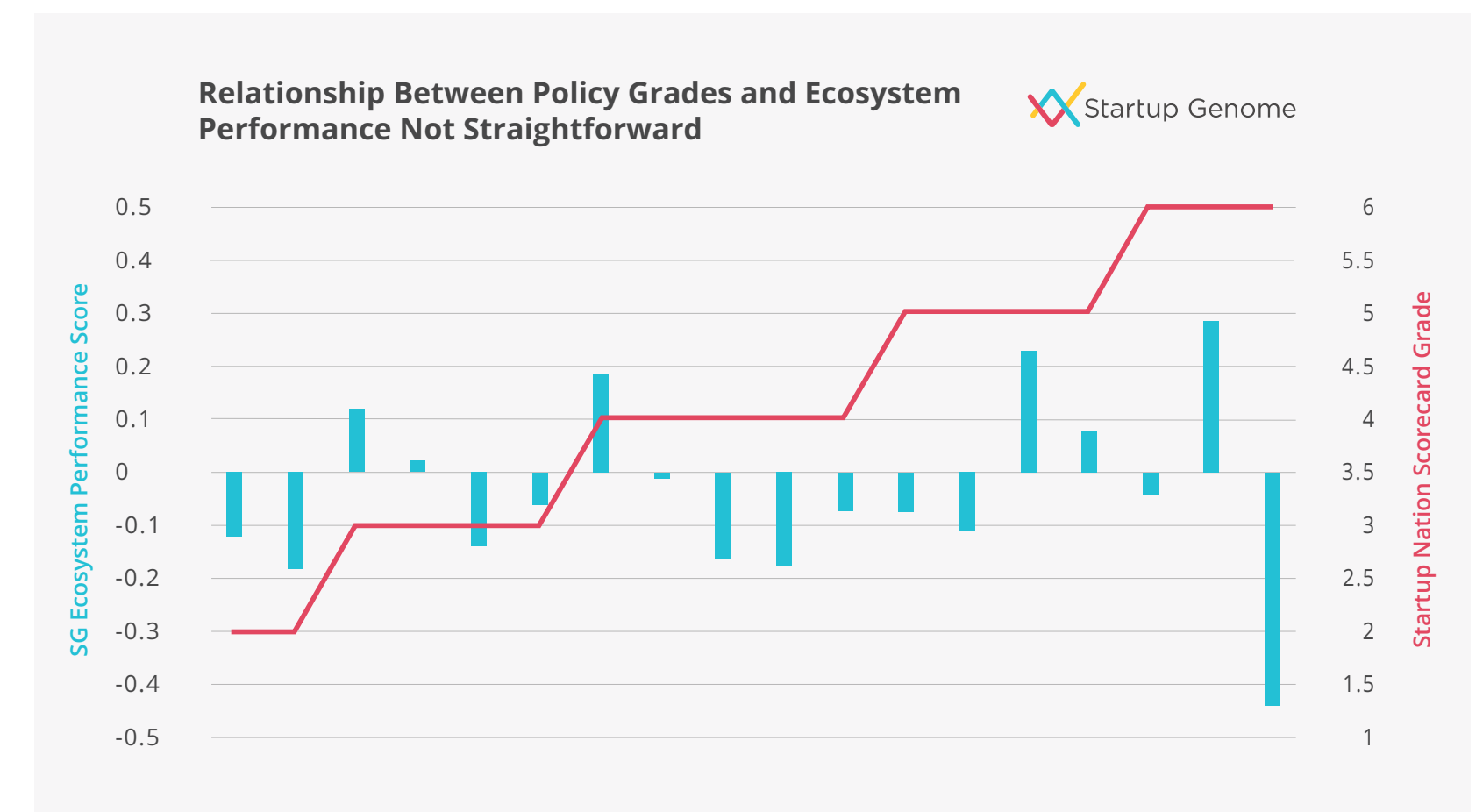


Figure 2. The Startup Nation Scorecard assigned descriptive grades to each country (e.g., “Most advanced,” “Needs work,” “Least advanced,” and so on). We converted these to a numerical scale so the highest scorecard grade (“Most advanced”) is a 6, and the lowest (“Least advanced”) is a 1.

the policy scores in these areas, the impact of policy becomes even less certain. Indeed, it appears negligible.

In Figure 3 for example, is the correlation between Startup Genome’s ecosystem performance scores and country-level policy scores on the Institutional Framework policy pillar.

When we look at policy adoption in the Skills & Education pillar (Figure 4), we actually find a slightly negative relationship.

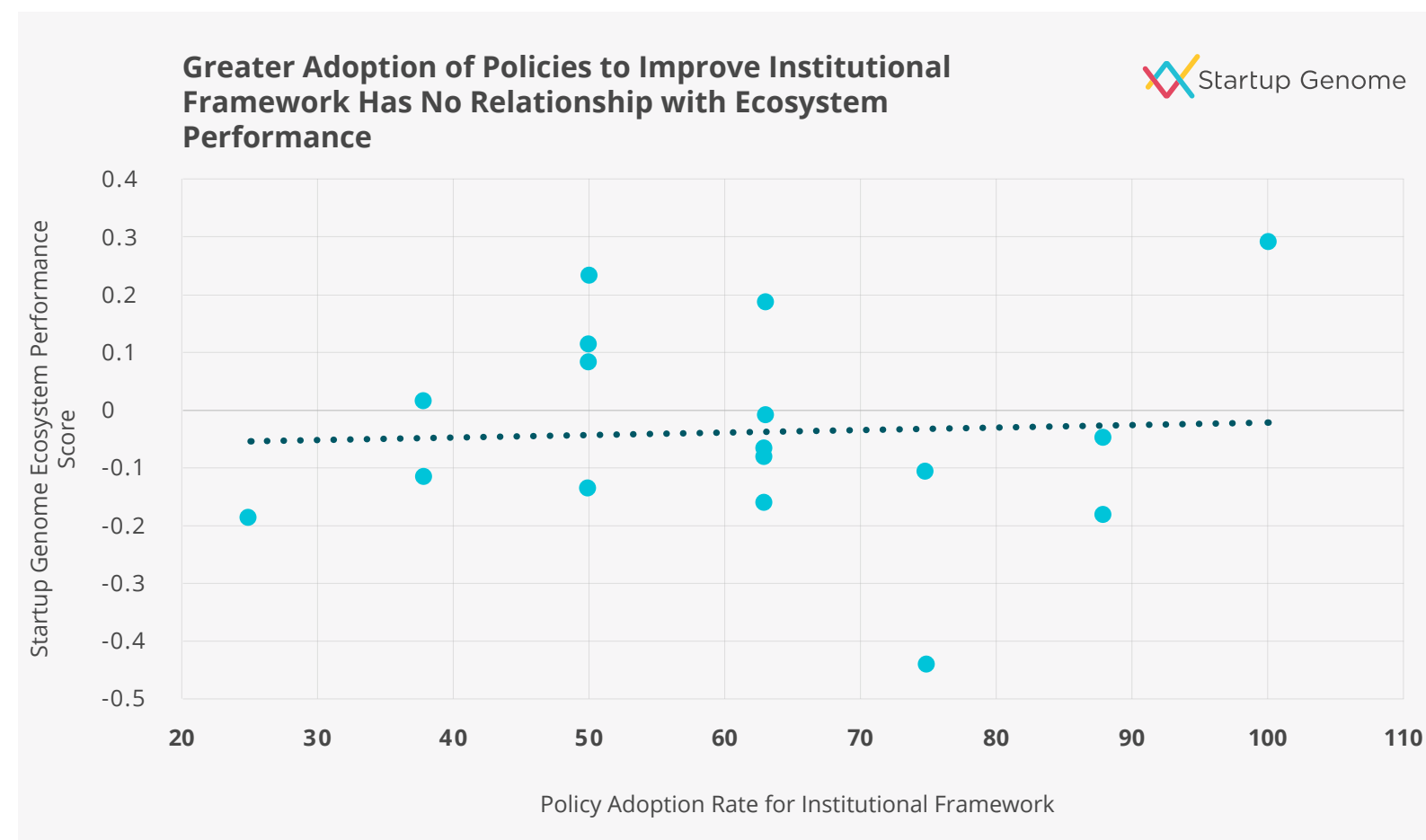


Figure 3. Sources: Startup Genome; Startup Nation Scorecard.

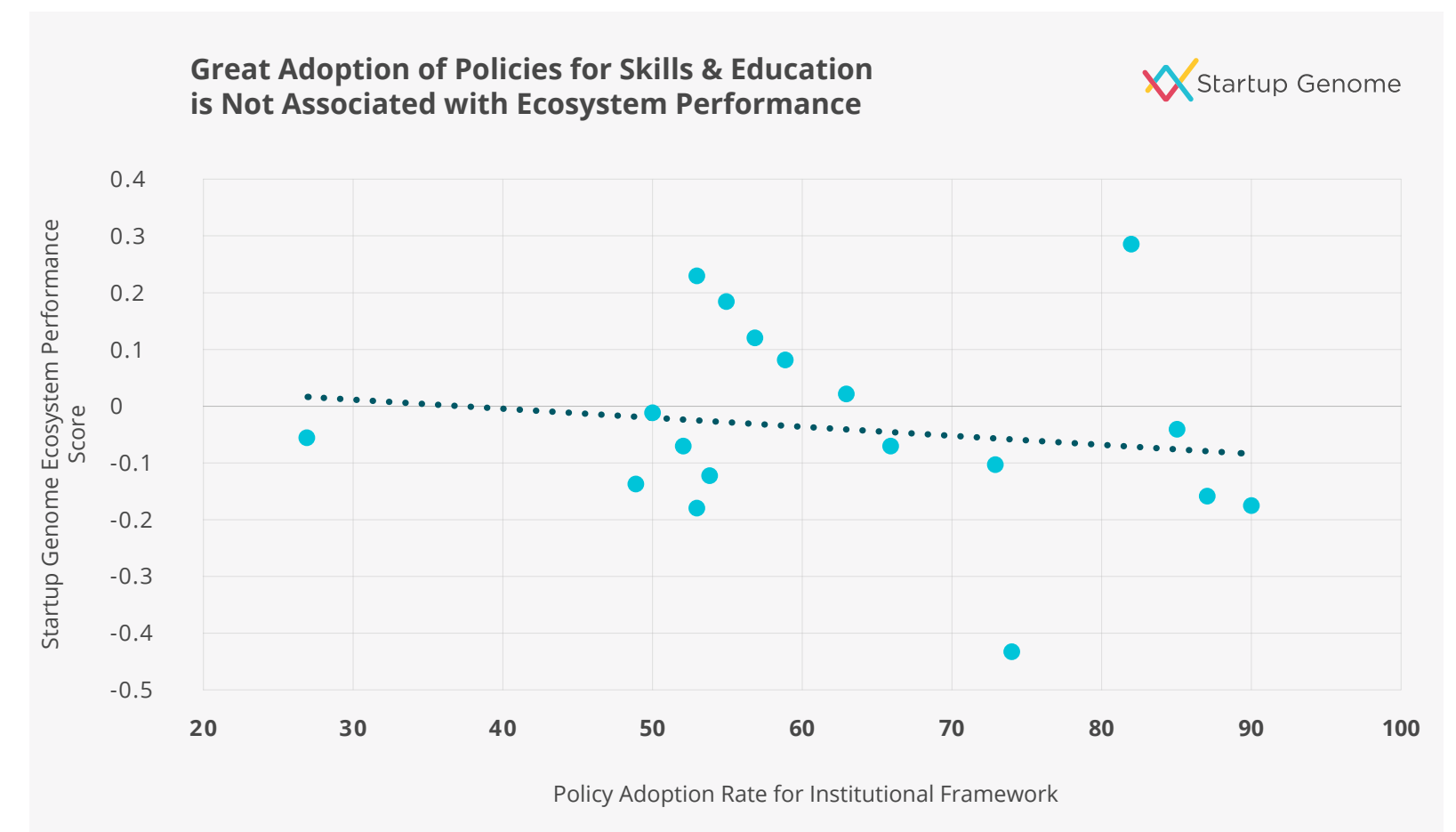


Figure 4. Sources: Startup Genome; Startup Nation Scorecard.

The same findings hold in the Access to Talent and Thought Leadership policy pillars (charts not shown). Greater adoption of policy is not associated with greater ecosystem performance, either at the country level or in the main ecosystems.

There is, however, one exception.

Policy Helps Increase Funding for Startups

In this analysis, we found only one positive relation-

ship between policy actions and ecosystem performance. That was on funding: in the countries with high adoption rates for Access to Capital policies, we found the highest scores on early-stage funding. Note here that we are specifically comparing funding policies and funding scores, making the comparison more direct. This is true at the country level as well.

The relationship is not enormous but is the only positive one we found — and likely explains the slightly positive correlation we found between overall policy adop-

tion and overall ecosystem performance. The causal mechanism is clearly difficult to identify here. Perhaps ecosystems with the strongest track record of funding are those where more actions are taken subsequently. Neither are all public efforts to boost access to finance created equal. It could be the case that direct public funding has a different impact from the attraction of private capital.

The history of government efforts to boost equity investments is checkered.⁵ In Europe, at least, it appears

as if policy actions are paying off in terms of greater early-stage funding for startups.

What’s Next?

Conclusively determining the impact of public policy on entrepreneurship is not easy, which likely explains why efforts to do so are few and far between. A policy on the books is not always the same as the policy implemented, and sometimes ad hoc policy may be more effective than policy actions taken as part of a strategic plan. We have also been working with GEN to assemble lessons learned from the experience of policymakers around the world, which provides a valuable qualitative dimension to the analysis.

Our findings here are suggestive, not definitive, and we are committed to further work on policy with our Member ecosystems and GEN.

5. Josh Lerner, *Boulevard of Broken Dreams*.

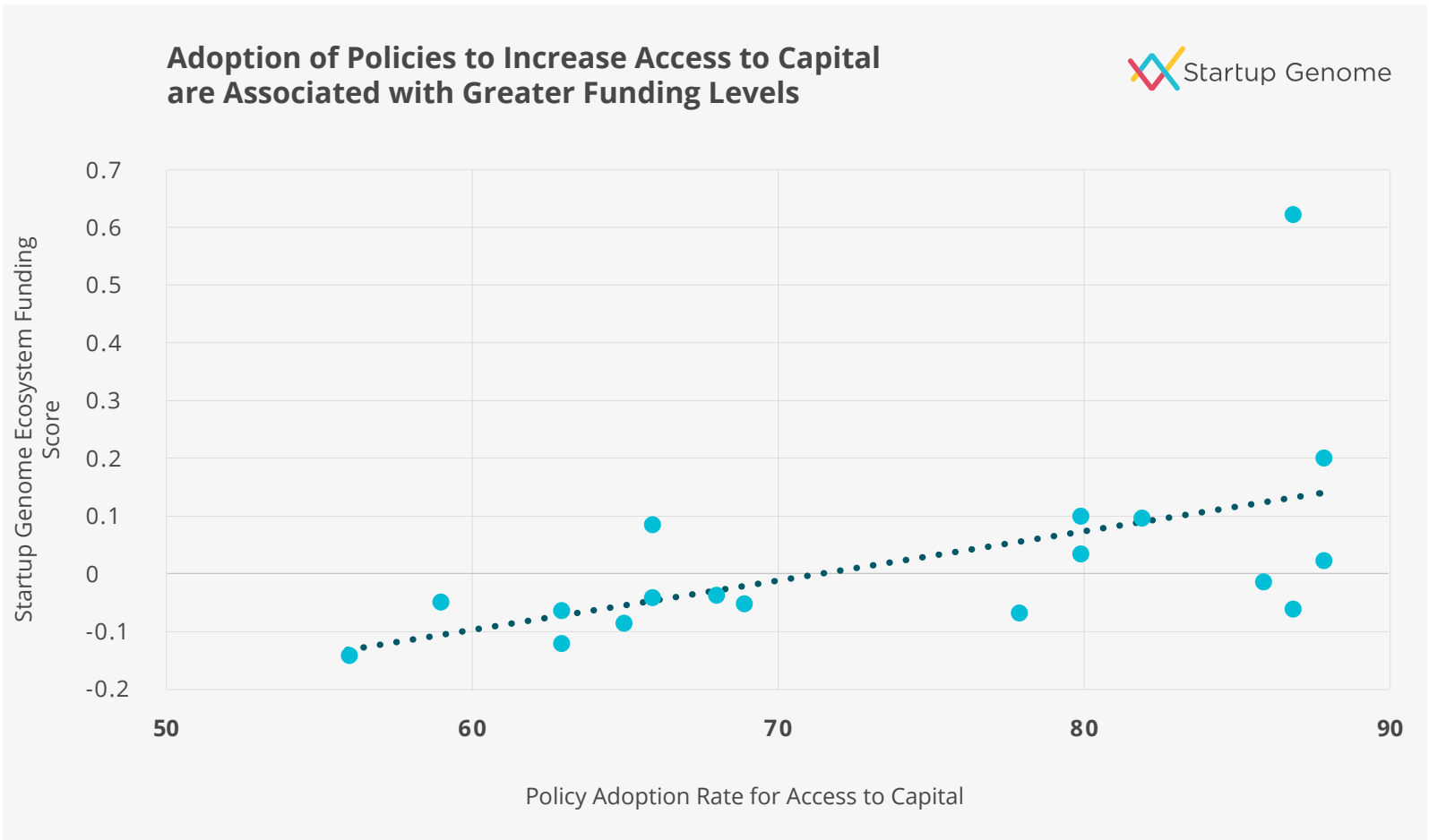


Figure 5. The Startup Genome Ecosystem Funding Score is a relative comparison of ecosystems on the levels of early-stage funding, the number of deals, and growth in early-stage funding.



Global Startup Ecosystem Ranking

The Top Global Ecosystems of Today and Tomorrow

Key Findings

- The top five startup ecosystems in the world are Silicon Valley, New York City, London, Beijing, and Boston — with Beijing and London tied for #3
- Amsterdam-StartupDelta experienced the largest increase in rankings, rising from #19 in 2017 to #15 in 2019. This was partly driven by two billion-dollar IPOs in 2018: Adyen and Elastic, now collectively valued at nearly \$30 billion at the time of this writing
- North America continues to dominate, being home to 14 of the top 30 top startup ecosystems, with 12 of those in the United States
- Yet what we call the Next 30, vibrant ecosystems enjoying rapid growth, has an even distribution of across Asia-Pacific, Europe, and North America

Startup Genome's coverage of ecosystems is growing. Our analysis, expanding from 60 ecosystems in 2018

to 150 in 2019, allowed us to rank the top 30 overall startup ecosystems. In the past, our ranking had included only the top 20.

Silicon Valley remains in the position it has held since 2012: the #1 global startup ecosystem. Beijing has risen into the top 3, tying with London. The top 5, however, remain the same as they were in 2017: Silicon Valley, New York, London, Beijing, and Boston.

A key change in this year's Global Startup Ecosystem Ranking is that we have added Life Sciences and Deep Tech factors to our analysis. To do so, we've worked with Professor David Rigby at UCLA and Hello Tomorrow, a deep technologies-focused organization. This comprehensive analysis drives part of the changes in rankings. For example, ecosystems such as San Diego and Washington, D.C., now appear in the top 20 due to their strength in Life Sciences.

2019 Global Startup Ecosystem Ranking

	Ranking	Change from 2017	Performance	Funding	Market Reach	Connectedness	Talent	Experience	Knowledge	Growth Index
Silicon Valley	1	0	1st	1st	1st	1st	1st	1st	1st	5
New York City	2	0	1st	1st	3rd	2nd	2nd	1st	2nd	6
London	3-4	0	1st	1st	1st	1st	2nd	2nd	1st	6
Beijing		▲ 1	1st	1st	5th	5th	1st	1st	1st	4
Boston	5	0	1st	2nd	2nd	3rd	1st	1st	2nd	7
Tel Aviv	6-7	0	2nd	2nd	2nd	1st	2nd	2nd	1st	6
Los Angeles		▲ 3	1st	1st	3rd	4th	3rd	2nd	3rd	5
Shanghai	8	0	2nd	2nd	2nd	4th	1st	3rd	1st	6
Paris	9	▲ 2	2nd	1st	3rd	2nd	3rd	3rd	2nd	8
Berlin	10	▼ -3	3rd	2nd	1st	1st	2nd	3rd	4th	6
Stockholm	11	▲ 3	3rd	2nd	2nd	2nd	4th	2nd	2nd	7
Seattle	12	▼ -2	2nd	3rd	3rd	3rd	1st	1st	3rd	5
Toronto-Waterloo	13	▲ 3	3rd	2nd	1st	3rd	4th	4th	3rd	5
Singapore	14	▼ -2	2nd	4th	4th	1st	2nd	3rd	4th	5
Amsterdam-StartupDelta	15	▲ 4	2nd	3rd	5th	3rd	5th	4th	3rd	7
Austin	16	▼ -3	3rd	3rd	4th	4th	1st	1st	3rd	5
Chicago	17	▲ 1	3rd	4th	4th	5th	3rd	4th	5th	4
Bangalore	18	▲ 2	3rd	4th	5th	2nd	4th	4th	2nd	7
Washington, D.C.	19	NEW	4th	3rd	3rd	5th	4th	2nd	4th	5
San Diego	20	NEW	4th	3rd	4th	4th	3rd	3rd	4th	6
Denver-Boulder	21	NEW	4th	4th	4th	4th	3rd	2nd	4th	7
Lausanne-Bern-Geneva	22	NEW	4th	4th	2nd	3rd	5th	5th	2nd	9
Sydney	23	▼ -6	5th	5th	5th	2nd	4th	5th	5th	7
Vancouver	24	▼ -9	4th	5th	1st	3rd	3rd	3rd	3rd	6
Hong Kong	25	NEW	5th	5th	2nd	1st	4th	5th	5th	6
26-30 in alphabetical order										
Atlanta	26-30	NEW	5th	5th	4th	5th	2nd	4th	5th	4
Barcelona		NEW	5th	4th	5th	4th	5th	5th	5th	6
Dublin		NEW	5th	3rd	5th	5th	5th	4th	5th	5
Miami		NEW	4th	5th	1st	5th	5th	5th	4th	5
Munich		NEW	5th	5th	3rd	2nd	5th	5th	1st	7

Top ranked ecosystems classified in tiers from 1st (top) to 5th

Software Ecosystem Ranking Comparison, 2017-2019

While the 2019 global startup ecosystem rankings include Life Sciences and Deep Tech startups and metrics (like patents and R&D), the software (or tech-only) rankings in 2017 and 2019 do not.



	2019		2017
	Global Ecosystem Ranking	Software Ecosystem Ranking	Software Ecosystem Ranking
Silicon Valley	1	1	1
New York City	2	2	2
London	3-4	3	3
Beijing	3-4	3	4
Boston	5	5	5
Tel Aviv	6	6	6
Berlin	10	10	7
Shanghai	8	9	8
Los Angeles	6	6	9
Seattle	12	12	10
Paris	9	8	11
Singapore	14	14	12
Austin	16	15	13
Stockholm	11	11	14
Vancouver	Outside Top 20	Outside Top 20	15
Toronto-Waterloo	13	13	16
Sydney	Outside Top 20	Outside Top 20	17
Chicago	17	19	18
Amsterdam-StartupDelta	15	16	19
Bangalore	18	17	20

For clarity and comparison, we also show what the rankings would look like if we had excluded Life Sciences.

This year, the ecosystem with the largest increase in rankings is Amsterdam-Startup-Delta, moving up four spots from 2017 to the #15 overall ecosystem. This is thanks to high growth in funding, startup output and exits, as well as strong performance in Life Sciences and Deep Tech. Amsterdam-StartupDelta’s growth is also helped by two billion-dollar IPOs in 2018: Adyen (a Fintech company now valued at almost \$23 billion) and Elastic (a search and data company now valued at over \$6 billion). It may be a challenge, however, for Amsterdam-StartupDelta to maintain such production of billion-dollar startups.

Three other ecosystems have also moved up in the rankings: Los Angeles (from #9 in 2017 to #6 in 2019), Stockholm (from #14 to #11), and Toronto (from #16 to #13). You can read more about these startup ecosystems and nearly 50 others in the Deep Dives section of the report and at startupgenome.com.

Ten new ecosystems appear among the top global startup ecosystems for the first time this year:

- Atlanta
- Barcelona
- Denver-Boulder
- Dublin
- Hong Kong
- Lausanne-Bern-Geneva
- Miami
- Munich
- San Diego
- Washington, D.C.

Of these ten new top ecosystems:

- Four (Washington, D.C., San Diego, Lausanne-Bern-Geneva, and Munich) have made it to the top global rankings largely aided by their strong performance in Life Sciences, which we cover in more detail in that section of the report.
- Two of the 10, Atlanta and Denver-Boulder, had been runners-up for top 20 ecosystems in the world since 2012.
- Of the remaining four new top ecosystems, Miami does especially well in Market Reach, ranking in Tier 1 on this factor, due to a high percentage of foreign customers for local startups (30%) and deep ties to Latin America’s top ecosystems.

- Hong Kong also overperforms in Market Reach and has high Connectedness to top startup ecosystems.
- Barcelona and Dublin have both risen primarily due to robust activity in Funding, relative to their ecosystem size.

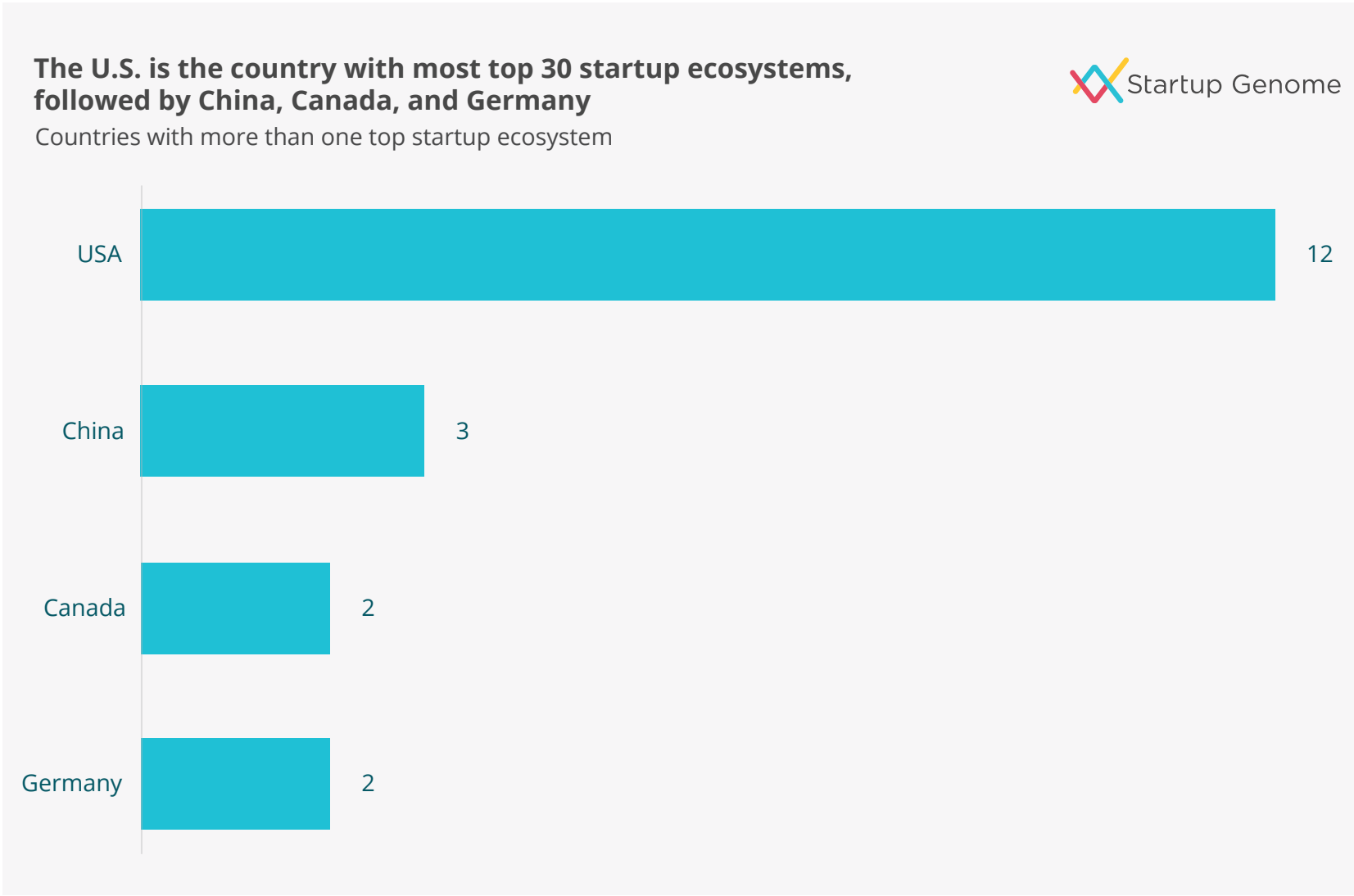
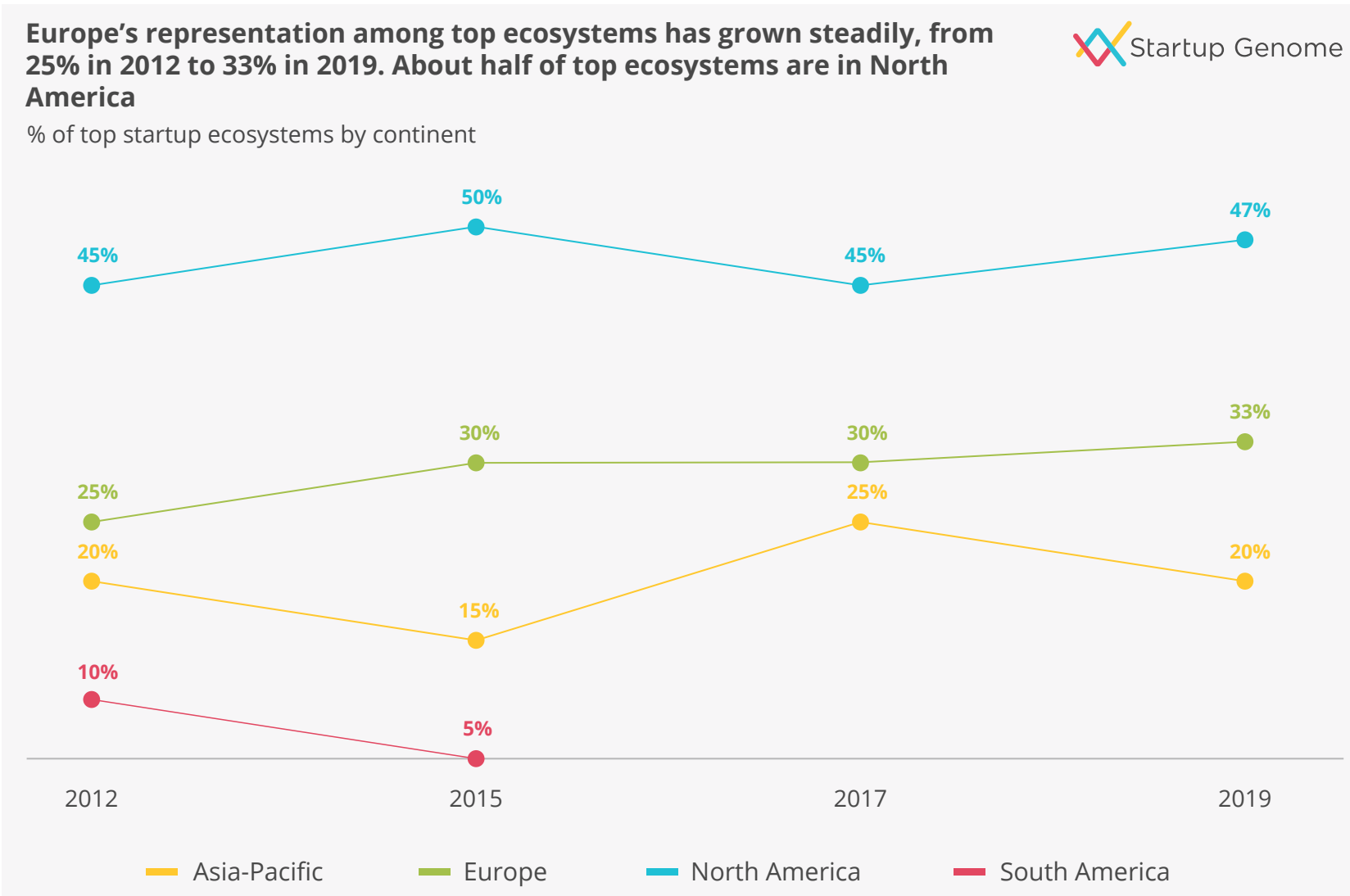
At the same time, some ecosystems have experienced a relative drop in the rankings. For example, while the startup ecosystems in Sydney and Vancouver are still growing, they fell down the list. There are two main reasons for this. First, four ecosystems making a debut

among the top (Denver-Boulder, Lausanne-Bern-Geneva, San Diego, Washington, D.C.) have risen past them. Of these, three have a top 20 Life Sciences ecosystem, which neither Vancouver nor Sydney has. Second, compared to other top ecosystems, their levels of Funding are static. As we demonstrate below, even if we had excluded Life Sciences from this analysis, Vancouver and Sydney would still have fallen.

Berlin, which was #7 in our 2017 ranking, dropped to #10. While it is still a high-performing ecosystem, it

faces a challenge we highlighted in our 2017 report: Berlin had two 2014 IPOs worth close to \$14 billion total (from Zalando and Rocket Internet), but has not produced comparable successes since. As exits declined, its rank followed.

Seattle and Austin declined in rankings by two and three spots respectively. While their relative positions among U.S. ecosystems remain the same — they are both in the top six American ecosystems — their relative decline at the global level has to do with the growth of



startups in more countries and the globalization of the startup tech scene as a whole.

At the continental level, North America continues to dominate, being home to 14 of the top 30 top startup ecosystems, with 12 of those in the United States. Europe has steadily risen since 2012, going from 25% of top ecosystems then to 33% in 2019.

The Top 30 and the Next 30

In this report we rank the top 30 global startup ecosystems — the highest-performing cities and regions across our Ecosystem Success Factors.

The list is far from static, and we see considerable movement in, out, and within the rankings. Even when an ecosystem moves down the rankings, it is often due to the gains of others. There is real competition between regions for talented founders, experienced employees, investment capital, and attention. Startups are dynamic, and the ecosystems in which they operate match that dynamism.

Importantly, the top 30 ecosystems of today are not necessarily the top 30 ecosystems of the future. In fact, we’re willing to bet that perhaps half of today’s top 30 will be displaced by those in what we call the Next 30.

To capture the dynamism within our rankings, and convey the rapid growth taking place all over the world,

we classify startup ecosystems into four general types. Within these general types are also sub-types.

Leaders

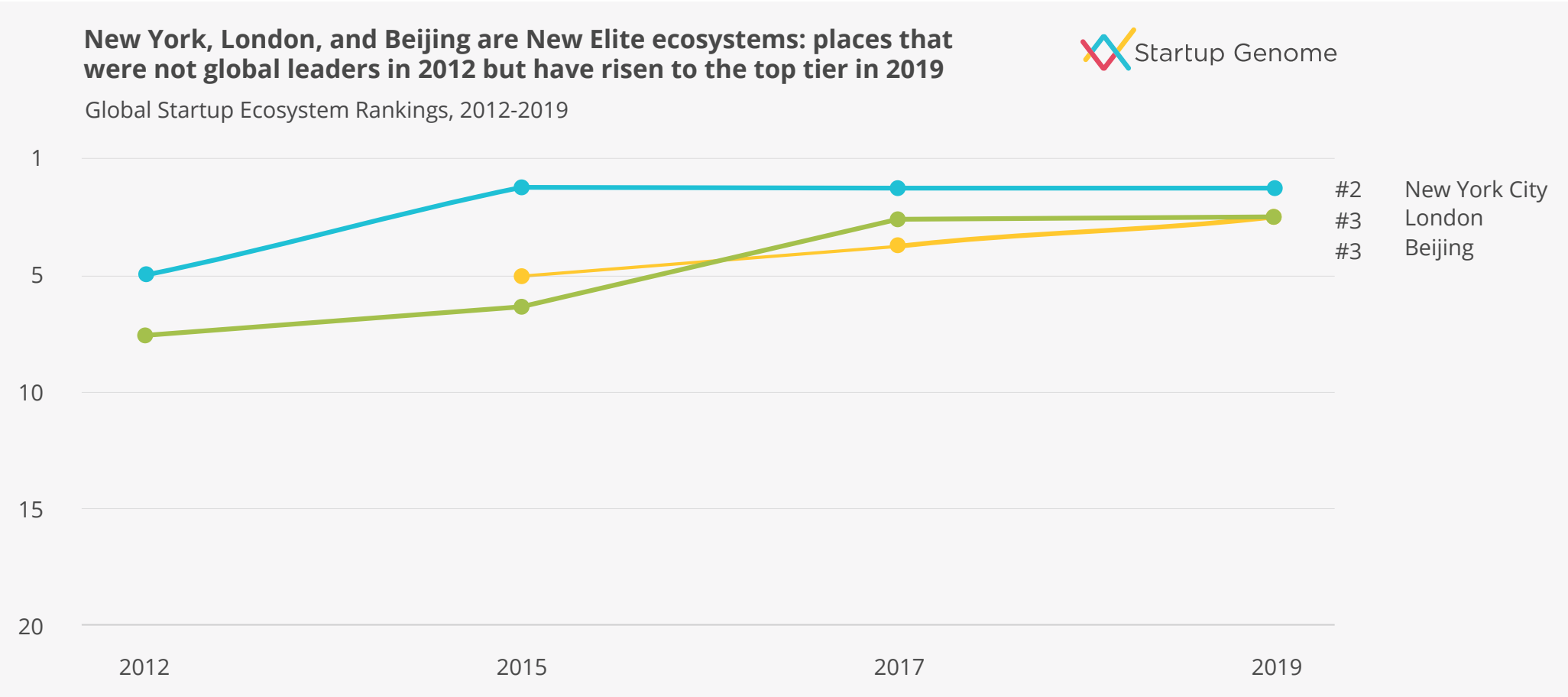
Leaders are the ecosystems among the top #7 in the world, with strong performance across most Ecosystem Success Factors, each of them creating at least \$30 billion in Ecosystem Value, with a median of \$56 billion.

Three of these top seven ecosystems are what we call New Elites: New York City, London, and Beijing.

Leader Startup Ecosystems



	Ranking	Country	Continent
Silicon Valley	1	USA	North America
New York City	2	USA	North America
London	3-4	UK	Europe
Beijing	3-4	China	Asia-Pacific
Boston	5	USA	North America
Tel Aviv	6-7	Israel	Europe
Los Angeles	6-7	USA	North America



While we did not publish Beijing in the 2015 report, we assessed its ranking as among the top 5 then.

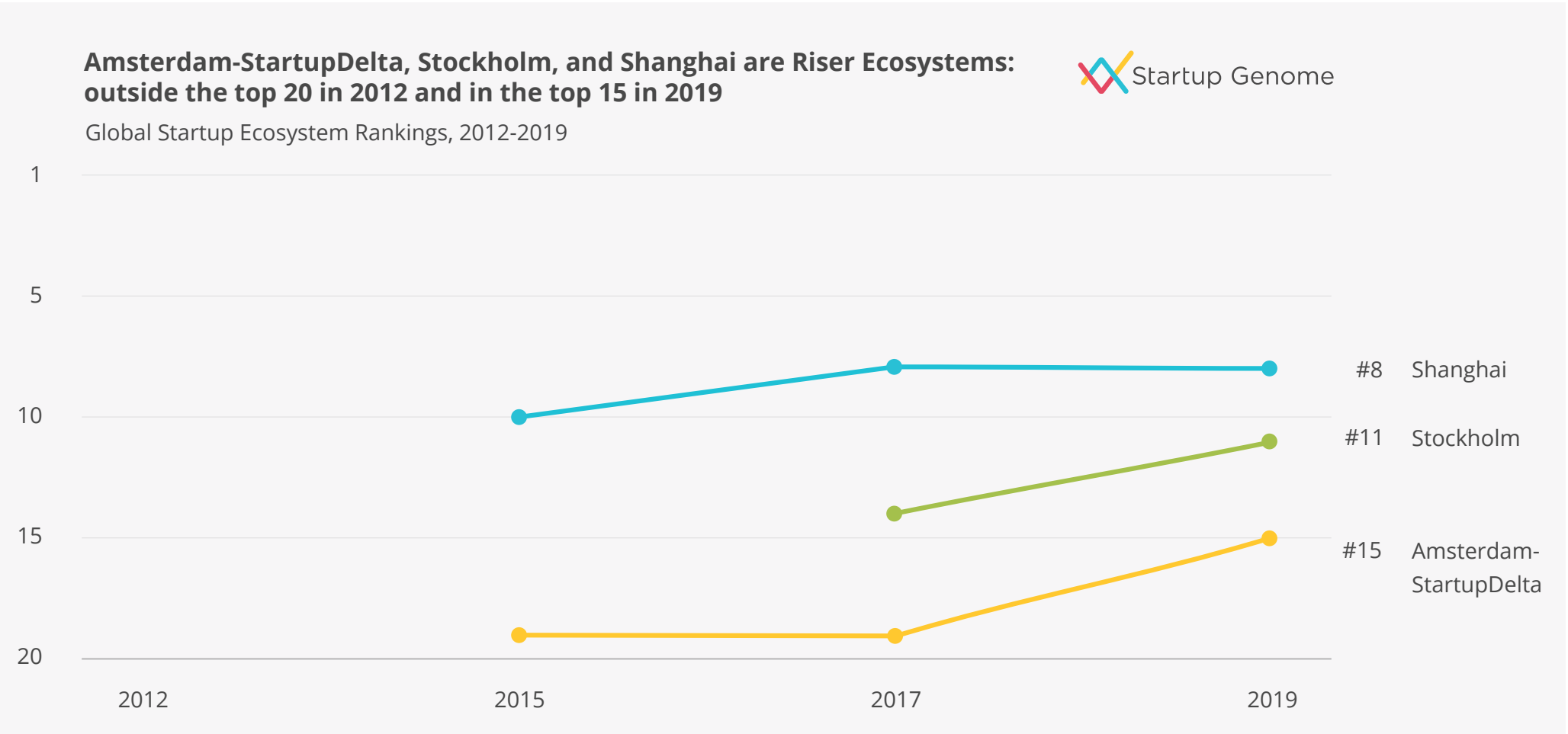
While each has deep entrepreneurial roots, they have grown consistently since our first analysis in 2012, when they were not among the global top 3 ecosystems. New York City has solidified its status as a leading startup ecosystem, with London and Beijing in a tie for third.

Major Hubs

Major Hubs are well-established global cities that have startup ecosystems ranked in the top 25 and a history of high performance. Among the 13 Major Hubs, nine have been consistently ranked in the overall top 20 since 2012.

Major Hub Startup Ecosystems

	Ranking	Country	Continent
Shanghai	8	China	Asia-Pacific
Paris	9	France	Europe
Berlin	10	Germany	Europe
Stockholm	11	Sweden	Europe
Seattle	12	USA	North America
Toronto-Waterloo	13	Canada	North America
Singapore	14	Singapore	Asia-Pacific
Amsterdam-StartupDelta	15	Netherlands	Europe
Austin	16	USA	North America
Chicago	17	USA	North America
Bangalore	18	India	Asia-Pacific
Sydney	23	Australia	Asia-Pacific
Vancouver	24	Canada	North America



While we did not publish Shanghai in the 2015 report, we assessed its ranking as among the top 10 then.

There is, nevertheless, a good deal of competition among these ecosystems. Venture capital, once an overwhelmingly American industry, has globalized. This has eroded the relative standing of cities like Chicago and Seattle, even though their startup ecosystems remain strong. In Europe, Berlin was once the undisputed hub in the continent after London. In the past few years — driven primarily by strong performance in Deep Tech — Paris and Stockholm have strengthened their positions relative to Berlin. The rapid development of technol-

ogy and ecosystems in China has shifted the regional balance in the Asia-Pacific region in the past seven years. Although seeing recent declines, Vancouver and Sydney remain Major Hubs thanks to their historically high performance.

Among the Major Hubs, three ecosystems stand out for their growth over the past seven years and their rapid movement up the rankings. We call these Risers: Shanghai, Stockholm, and Amsterdam. Each was outside the top 20 in 2012 and is now ranked in the top 15 in 2019.

Yet the Major Hubs are being challenged — some of these ecosystems are at risk of losing their top 30 status because of growth elsewhere. The competition is coming from Momentum and Challenger ecosystems.

Momentum

Momentum ecosystems are those places that have never been part of the top global startup ecosystems since 2012 but have now cracked the top 30.

Some have been on the cusp of the top ranking, such as Denver-Boulder and Atlanta, which were runners-up for the top 20 list in 2012. Several Momentum ecosystems have experienced growth driven by strength in specific sub-sectors. Munich, for example, is a top 10 ecosystem in Advanced Manufacturing & Robotics (the

Momentum Startup Ecosystems 			
	Ranking	Country	Continent
Washington, D.C.	19	USA	North America
San Diego	20	USA	North America
Denver-Boulder	21	USA	North America
Lausanne-Bern-Geneva	22	Switzerland	Europe
Hong Kong	25	China	Asia-Pacific
Atlanta	26-30	USA	North America
Barcelona	26-30	Spain	Europe
Dublin	26-30	Ireland	Europe
Miami	26-30	USA	North America
Munich	26-30	Germany	Europe

fastest-growing sub-sector globally), and San Diego is the third-ranked ecosystem in Life Sciences. (See our analysis of Life Sciences ecosystems later in this report.)

Challengers

So who are the Next 30? What ecosystems show the potential to make the top 30 within five years? For the answers, we look at the Challengers, ecosystems currently outside the top 30 ranking but growing rapidly.

This is a diverse group, with Lagos and Jakarta alongside Moscow and Melbourne. There are giant urban agglomerations (Tokyo, population 38 million) and rather small ones (Greater Helsinki, population 1.5 million). The juxtaposition is a good reminder that startup ecosystem performance is not simply a function of population size or GDP. They're related, but the startup ecosystem in São Paulo can generate just as much success as the one in Montreal.

Each Challenger ecosystem has at least one company in the billion-dollar club (unicorns and exits). They also share key characteristics:

- **Regional leadership:** some are major focus points in their areas of the world, as São Paulo is in South America, Lagos is in Africa, and Jakarta — the 4th most populous metropolitan area in the world and home to four unicorns — is in Southeast Asia.

- **Sub-sector leadership:** some have a world-class ecosystem in specific startup sub-sectors, as Shenzhen has in Advanced Manufacturing & Robotics, and Montreal has in AI (both top 20 global ecosystems for these sub-sectors).

Challenger Startup Ecosystems 		
	Country	Continent
Greater Helsinki	Finland	Europe
Hangzhou	China	Asia-Pacific
Jakarta	Indonesia	Asia-Pacific
Lagos	Nigeria	Africa
Melbourne	Australia	Asia-Pacific
Montreal	Canada	North America
Moscow	Russia	Europe
Mumbai	India	Asia-Pacific
São Paulo	Brazil	South America
Seoul	Korea	Asia-Pacific
Shenzhen	China	Asia-Pacific
Tokyo	Japan	Asia-Pacific

Understanding the Model: Why You Should Care About Measuring Your Startup Ecosystem

The underlying drive for the Global Startup Ecosystem Report is to answer three key questions founders, investors, and policymakers have been asking all over the globe:

- Where are the top performing ecosystems in the world? Put differently, where do early-stage startups have the best shot at building global success?
- Why are some places on the rise while others are falling behind?
- How can ecosystems increase their chances of winning in the global startup revolution?

Since 2011 — starting as a research project with Steve Blank, the father of the Lean Startup movement, and Prof. Chuck Eesley at Stanford University — we have been on a mission to codify and understand the Success Factors of startup ecosystems so more places have a chance of creating and capturing their fair share of value created by the global startup revolution.

We have made tremendous progress since then and continue to do so. What you are looking at is by far the deepest, most comprehensive startup ecosystem re-

search ever done — by Startup Genome, the Global Entrepreneurship Network, and our field in general. Among other things, this year our research has:

- More than doubled the number of ecosystems studied since our last published rankings — assessing over 150 ecosystems across over 30 countries to rank the top 30 globally.
- Expanded our research and overall rankings to include Deep Tech startups, partnering with Paris-based Hello Tomorrow to do so. Specifically, we have looked deeply at Life Sciences, publishing a top 20 ranking including all-new Life Sciences ecosystem Success Factors, which quantify innovation in policy and knowledge creation and diffusion.
- Studied more than 1 million patents, in partnership with Prof. David Rigby at UCLA, tying them to specific startup sub-sectors and ecosystems, calculating the potential of each technology class, and measuring the knowledge space of each of our studied ecosystems.
- Incorporated several real-time data sources to our broader model, from Google Trends to track public discourse on startups, to GitHub to identify active programmers, to Meetup data for measuring local tech events.
- Collected information on public policy actions taken by governments to support startup ecosystems. Our

initial “audit” of public policy will serve as the basis for subsequent analyses tying specific policy actions to ecosystem performance.

Bringing it together, this means Startup Genome’s broader Ecosystem Assessment Framework includes over 200 metrics, which better capture the ecosystem factors that drive startup performance.

For the 2019 rankings specifically, we measured a total of nine Success Factors — six factors each for Overall Ecosystem Rankings and Life Sciences Rankings, with some overlap among these — listed below (see the Methodology section for more details).

- Performance
- Funding
- Market Reach²
- Talent
- Experience³
- Connectedness (new factor)⁴
- Knowledge (new factor)
- Infrastructure (new factor. Deep Tech only)
- Policy (new factor. Deep Tech only)

2. Part of overall Startup Ecosystem Rankings, not included in the Deep Tech assessment

3. Same as above

4. Same as above

The three main questions we start this section with unfold into many strategic questions Startup Genome's ecosystem assessment framework can help answer. For example:

For founders and startup executives:

- Where should I create my tech startup to maximize my chances of success?
- Where should I open a second office?
- Which startup sub-sectors are growing the most now? Which ecosystems are best for specific types of startups (e.g., AI)?
- Where can I get the most bang for buck in terms of cost?

For investors:

- Where do startups have the best odds for raising additional funding?
- Which ecosystems have the top performance in my sub-sector of focus?
- Which high-performing ecosystems have a gap in experienced local investors I might be able to benefit from?

For policymakers:

- How should I change local policies to support our startup ecosystem?

- What are the biggest gaps in our startup economy I should focus on addressing first?
- How should I measure the progress of our startup ecosystem?

Key Concepts

Ranking Score

The ranking is primarily driven by one question: In which ecosystems does an early-stage startup have the best chance of building a global success?

Startup

Steve Blank defines a startup as a “temporary organization in search for a repeatable and scalable business model.” We use this definition to look across sectors and sub-sectors, including software, hardware, health, energy, and others.

Ecosystem

Defined around the concept of a shared pool of resources, generally located within a 60-mile (100-kilometer) radius around a center point in a given region, with a few exceptions based on local reality.

Ecosystem Success Factors Model

Our principal analytical tool, this measures different dimensions of what supports the performance of local startups. We look at nine factors for our rankings: one measuring actual performance, with eight Success Factors associated with performance, each comprised of sub-factors and metrics. These factors are highlighted in our Methodology section, as well as in each rankings section.

Success Factor Highlights

Distance to Frontier: Understanding the Scores

For each Sub-Factor inside the Success Factors we present a distance to frontier score, where 10 is the maximum value for that metric across the ecosystems we studied and 0 is the minimum value. For the factors with most skew, Performance and Funding, we calculated a log of the underlying value before transforming it into a score between 0 and 10.

Performance

Key Findings on Performance

- Silicon Valley stands head and shoulders above other ecosystems, with top scores across every Performance Sub-Factor;
- Ecosystem Value has a skewed distribution, with Silicon Valley being the only ecosystem getting top scores in that Sub-Factor, reflecting the fact that the value generated by the tech scene is concentrated in the area;
- Beijing has the second largest Ecosystem Value in the world, largely driven by high funding rounds valuations. These massive levels of Funding, however, have not yet translated into top activity in Exits.

	Performance			
	Ecosystem Value	Exits	Startup Output	Startup Success
Silicon Valley	10	10	10	10
New York City	6	8	9	7
London	6	7	8	5
Beijing	8	7	9	10
Boston	5	8	8	7
Tel Aviv	5	5	8	7
Los Angeles	6	7	8	6
Shanghai	6	6	8	9
Paris	4	5	7	5
Berlin	4	4	7	7
Stockholm	5	5	6	4
Seattle	4	6	7	6
Toronto-Waterloo	3	5	7	7
Singapore	4	4	8	8
Amsterdam-StartupDelta	3	6	8	6
Austin	2	5	7	8
Chicago	3	5	7	7
Bangalore	4	4	7	6
Washington, D.C.	2	4	7	5
San Diego	2	5	6	5
Denver-Boulder	1	4	7	7
Lausanne-Bern-Geneva	1	4	6	7
Sydney	1	4	7	6
Vancouver	2	5	6	5
Hong Kong	2	3	6	9
Atlanta	Runners-up			
Barcelona				
Dublin				
Miami				
Munich				

The Performance Success Factor Assesses:

- **Ecosystem Value** — a measure economic impact of the ecosystem, calculated as the total exit valuation and startup valuations over a two and a half year time period.
- **Exits** — the number of exits over \$50 million and \$1 billion, as well as the growth of exits.
- **Startup Output** — the number and growth of software startups in the ecosystem, excluding Life Sciences and Hardware companies.
- **Startup Success** — how much startups succeed in the ecosystem. Measured in early-stage success (ratio of Series B to Series A companies), late-stages success (ratio of Series C to A companies and number of billion-dollar club startups), and speed to exit (both to IPO and other exits).

Funding

Key Findings on Funding

- Bangalore, Sydney, Stockholm, and Berlin stand out for their relatively low levels of Funding Quality, driven by lack of local, experienced VCs compared to other ecosystems.
- Silicon Valley, New York City, London, and Boston perform incredibly well in both Funding Quality and Access.
- Among top global ecosystems, the places most hindered in the rankings by a gap in early-stage funding are Vancouver, Sydney, and Hong Kong.

	Startup Genome		Funding	
			Access	Quality
Silicon Valley			10	10
New York City			10	10
London			9	10
Beijing			9	9
Boston			9	10
Tel Aviv			9	7
Los Angeles			9	8
Shanghai			8	10
Paris			9	9
Berlin			8	4
Stockholm			8	3
Seattle			8	7
Toronto-Waterloo			8	7
Singapore			7	9
Amsterdam-StartupDelta			8	8
Austin			8	4
Chicago			8	8
Bangalore			8	2
Washington, D.C.			8	7
San Diego			8	8
Denver-Boulder			8	5
Lausanne-Bern-Geneva			8	5
Sydney			7	2
Vancouver			6	5
Hong Kong			7	8
Atlanta			Runners-up	
Barcelona				
Dublin				
Miami				
Munich				

The Funding Success Factor Assesses:

- **Access** — a function of early-stage funding volume, average funding per startup, and funding growth.
- **Quality** — a combination of the number of local investors, investors’ experience (average years of experience and exits ratio), and investors’ activity (percentage of active investors in past 12 months, and the number of new investors).

Market Reach

Key Findings on Market Reach

- Among the top 10 ecosystems, Beijing stands out for low levels of Global Market Reach. While Chinese startups benefit from a massive national market, only a small number of them are scaling globally.
- Startups in ecosystems with small local markets, like Tel Aviv and Hong Kong, sell to global customers at high rates (both with over 50% of foreign customers for local startups). While having a small local market might seem like a disadvantage, it has a silver lining, as it helps startups from these ecosystems go global and scale.
- Almost every top ecosystem has a strong national regulatory environment that encourages IP commercialization. Bangalore, Beijing, and Shanghai are the exceptions, with low scores in commercialization of IP assets.

	Market Reach		
	Global Reach	Local Reach	IP Commercialization
Silicon Valley	7	10	10
New York City	5	10	10
London	8	7	8
Beijing	4	9	2
Boston	5	10	10
Tel Aviv	8	4	10
Los Angeles	5	10	10
Shanghai	8	9	2
Paris	6	8	8
Berlin	10	8	8
Stockholm	7	5	8
Seattle	4	10	10
Toronto-Waterloo	8	7	10
Singapore	6	4	8
Amsterdam-StartupDelta	4	6	8
Austin	4	10	10
Chicago	4	10	10
Bangalore	5	7	2
Washington, D.C.	5	10	10
San Diego	4	10	10
Denver-Boulder	4	10	10
Lausanne-Bern-Geneva	8	5	10
Sydney	4	6	10
Vancouver	10	7	10
Hong Kong	9	4	2
Atlanta	Runners-up		
Barcelona			
Dublin			
Miami			
Munich			

The Market Reach Success Factor Assesses:

- **Global Reach** — how much startups are selling to global customers normalized by country GDP, so that ecosystems in countries with large economies do not need to have a percentage of foreign customers as high as ecosystems in smaller economies.
- **Local Reach** — size of local markets, proxied as a function of country GDP.
- **IP Commercialization** — indicator of how much the policy environment encourages the commercialization of tangible IP, measured at the country level.

Connectedness

Key Findings on Connectedness

- American ecosystems like Austin and Chicago, while high performing overall, show low levels of Connectedness with other top global ecosystems.
- Silicon Valley, New York, London, Tel Aviv, and Singapore show very high levels of Local Connectedness, with a culture of founders helping founders, frequent events, and entrepreneurs getting meaningful help from local experts and investors.

	Connectedness		
	Global Connectedness	Local Connectedness	Infrastructure
Silicon Valley	10	9	8
New York City	8	10	10
London	10	9	10
Beijing	3	5	6
Boston	7	7	10
Tel Aviv	10	9	4
Los Angeles	2	8	7
Shanghai	5	5	5
Paris	9	7	7
Berlin	10	8	3
Stockholm	9	6	4
Seattle	5	8	5
Toronto-Waterloo	7	7	6
Singapore	10	9	4
Amsterdam-StartupDelta	5	7	5
Austin	3	7	3
Chicago	2	8	8
Bangalore	7	8	4
Washington, D.C.	3	7	8
San Diego	2	8	7
Denver-Boulder	3	8	4
Bern-Geneva	7	6	7
Sydney	8	8	3
Vancouver	7	7	5
Hong Kong	9	8	4
Atlanta	Runners-up		
Barcelona			
Dublin			
Miami			
Munich			

The Connectedness Success Factor Assesses:

- Global Connectedness** — how much local startups are connected to the global fabric of knowledge, quantified through the number of relationships and local meetings with founders from top global ecosystems.
- Local Connectedness** — a function of how much support startups receive locally (measured as founders-helping-founders, as well as investors and experts helping startups), meaningful local relationships (among founders, inventors, and experts), and collisions (number and density of local tech events).
- Infrastructure** — a Life Sciences-focused measure of accelerators and incubators, research grants, and R&D anchors in the ecosystem (e.g., top research hospitals and R&D corporate labs).

Talent

Key Findings on Talent

- Silicon Valley, Beijing, Boston, Shanghai, Seattle, and Austin are all in the top tier for Talent for Tech and Life Sciences.
- Beijing, Shanghai, Singapore, Bangalore, and Hong Kong all benefit from high quality Talent that is relatively inexpensive compared to other top eco-systems.

	Talent				
	Tech			Life Sciences	
	Access	Quality	Cost	Access	Quality
Silicon Valley	10	10	2	9	10
New York City	9	9	2	10	7
London	8	9	8	10	9
Beijing	9	9	10	10	6
Boston	10	9	3	10	10
Tel Aviv	9	5	6	9	4
Los Angeles	8	9	3	9	9
Shanghai	9	9	10	10	6
Paris	8	9	9	10	6
Berlin	9	9	7	9	7
Stockholm	7	9	8	8	7
Seattle	9	10	2	2	10
Toronto-Waterloo	7	9	8	8	9
Singapore	8	8	10	7	10
Amsterdam-StartupDelta	6	9	8	9	7
Austin	10	9	5	5	7
Chicago	8	9	4	9	8
Bangalore	8	9	10	2	4
Washington, D.C.	7	9	4	6	9
San Diego	8	9	4	5	10
Denver-Boulder	9	9	6	5	6
Lausanne-Bern-Geneva	5	8	5	9	7
Sydney	8	9	7	8	6
Vancouver	8	9	8	2	8
Hong Kong	7	8	10	9	6
Atlanta	Runners-up				
Barcelona					
Dublin					
Miami					
Munich					

The Talent Success Factor Assesses:

- Tech Talent
 - Access — percentage of engineers and growth employees with at least 2 years of startup experience at time of hiring
 - Quality — a function of the number and density of top developers on GitHub, English proficiency, and historical exits — a proxy for experienced scaled teams in the ecosystem.
 - Cost — average software engineer salaries, whereas more expensive salaries lead to lower scores.
- Life Sciences Talent
 - Access — a count of STEM students and graduates, number of Life Sciences universities and degree programs in an ecosystem.
 - Quality — a function of Life Sciences quality at local universities and their programs.

Experience

Key Findings on Experience

- Ecosystems with a long history of startup activity show their deep benches of entrepreneurial experience in this factor: Silicon Valley, New York City, Boston, Seattle, and Austin are all in the top tier in terms of Experience. Beijing is also at the top, showing it is rapidly building a founder pool from which to draw experience.
- Hong Kong shows a major gap in Experience, with a current founder pool that does not have a lot of experience in hyper-growth startups.
- Vancouver stands out for having current startup founders with a lot of past scaleup experience and adoption of best practices for startup success (like having advisors with equity). In this Factor, Vancouver’s performance is on par with Silicon Valley.

Startup Genome		Experience		
		Scaling Experience	Startup Experience	Team Experience
Silicon Valley		10	10	10
New York City		10	10	6
London		9	10	4
Beijing		10	9	7
Boston		9	10	7
Tel Aviv		4	10	6
Los Angeles		9	10	5
Shanghai		7	8	6
Paris		5	10	5
Berlin		6	10	5
Stockholm		6	9	6
Seattle		7	10	8
Toronto-Waterloo		5	9	4
Singapore		4	9	5
Amsterdam-StartupDelta		6	9	2
Austin		6	10	9
Chicago		8	9	2
Bangalore		4	9	5
Washington, D.C.		5	10	6
San Diego		8	9	6
Denver-Boulder		3	9	8
Lausanne-Bern-Geneva		3	8	3
Sydney		3	8	4
Vancouver		3	7	10
Hong Kong		2	6	2
Atlanta	Runners-up			
Barcelona				
Dublin				
Miami				
Munich				

The Experience Success Factor Assesses:

- Scaling Experience — the cumulative number of significant exits (over \$50 million and over \$1 billion) over 10 years for startups founded in the ecosystem.
- Startup Experience — the cumulative number of early-stage companies started and funded in the ecosystem at Seed, Angel, and Series A stages.
- Team Experience — how much founding teams have previous startup experience and adopt best practices associated with startup success (such as offering stock options to all employees and average number of advisors with equity).

Knowledge

Key Findings on Knowledge

- Silicon Valley, London, Beijing, Tel Aviv, and Shanghai perform at the top in the Knowledge Factor, showing a combination of high levels of creation of tangible IP in the form of patents, research, and favorable Policy environments.
- Chicago and Washington, D.C. have relatively low levels of patent production, despite very supportive national environments for Research and Policy environment in Life Sciences.
- A weak Policy environment in India as well as relatively low levels of Research production means that Bangalore might face more challenges in Deep Tech startup sub-sectors — those requiring tangible IP — than it did in Software. Potentially, this might become a significant hindrance in the ecosystem, threatening its future growth.

Startup Genome		Knowledge		
		Patents	Research	Policy
Silicon Valley		10	10	10
New York City		8	10	10
London		9	10	7
Beijing		10	5	6
Boston		8	10	10
Tel Aviv		10	5	7
Los Angeles		8	10	10
Shanghai		10	5	6
Paris		8	9	7
Berlin		7	10	8
Stockholm		9	6	7
Seattle		7	10	10
Toronto-Waterloo		7	9	9
Singapore		8	3	7
Amsterdam-StartupDelta		8	7	7
Austin		8	10	10
Chicago		6	10	10
Bangalore		9	3	3
Washington, D.C.		6	10	10
San Diego		7	10	10
Denver-Boulder		7	10	10
Lausanne-Bern-Geneva		9	8	7
Sydney		7	7	7
Vancouver		7	9	9
Hong Kong		5	2	5
Atlanta	Runners-up			
Barcelona				
Dublin				
Miami				
Munich				

The Knowledge Success Factor Assesses:

- **Research** — based on the H-index, a measure of publication impact, this metric looks at the production of Life Sciences research at the country level.
- **Patents** — the volume, complexity, and potential of patents in Life Sciences created in the ecosystem.
- **Policy** — measured at the country level by public R&D spending and Clinical Trial Authorization (count of days required to authorize clinical trials, a measure of speed in the regulatory environment for Life Sciences).



Growth and Decline of Startup Sub-Sectors

A Lifecycle Look at the Fastest and Slowest Growing Startup Sub-Sectors

Key Findings

- Deep Tech startups — those relying heavily on tech breakthroughs and tangible IP — are the fastest-growing group globally. The top 4 startup sub-sectors with highest growth are Advanced Manufacturing & Robotics (#1), Blockchain (#2), Agtech & New Food (#3), and Artificial Intelligence (#4).
- Startup Sub-Sectors in the Growth Phase are increasing early-stage funding deals at an impressive rate of 90.7% over 5 years, while Mature-Phase Sub-Sectors have grown a respectable 15.9% over the same period, and Decline-Phase sub-sectors have gone down 35.7%.
- Sub-sectors are evolving in their lifecycle. Fintech is in a successful late Maturity Phase now, while Edtech has edged from Maturity to Decline. New Startup Sub-sectors continue to pop up in the Emergence Phase, like Quantum Computing.

- Growth has slowed down for all startup sub-sectors — including high-performing ones. We are around the peak of the economic cycle, with capital still flowing in, but growth rates are strong yet smaller than they were last year.

Global Trends in Startup Sub-Sectors

Just like products and ecosystems, startup sub-sectors evolve through a lifecycle. In this section of the report we cover global trends in that lifecycle development.

Similar to what we found last year, Deep Tech sub-sectors — areas like AI, Blockchain, and Robotics, which rely heavily on technological breakthroughs, research capacity, and tangible IP to succeed — are among the fastest growing startup sub-sectors. In addition, the largest declines are happening in sub-sectors increasingly dominated by big platforms, as in Adtech, or in pure software and internet areas like Digital Media and Gaming.

Sub-Sector Definitions

Please see our Methodology section for a full list of our sub-sectors and their definitions. Note that sub-sectors are not mutually exclusive nor comprehensive — some startups are in sub-sectors we did not cover.

In addition, at least from patents, the data shows a clear tech convergence. Technologies like AI are increasingly interrelated to other technology fields, and we would expect a similar convergence over time for Startup Sub-Sectors.²

For more detail, including in our machine learning classification of sub-sectors, please see our Methodology section. For more coverage on each sub-sector, please see their respective sections in the report.

² "Patents and the Fourth Industrial Revolution. The inventions behind digital transformation," December 2017. European Patent Office.

Top 4 fastest-growing startup sub-sectors

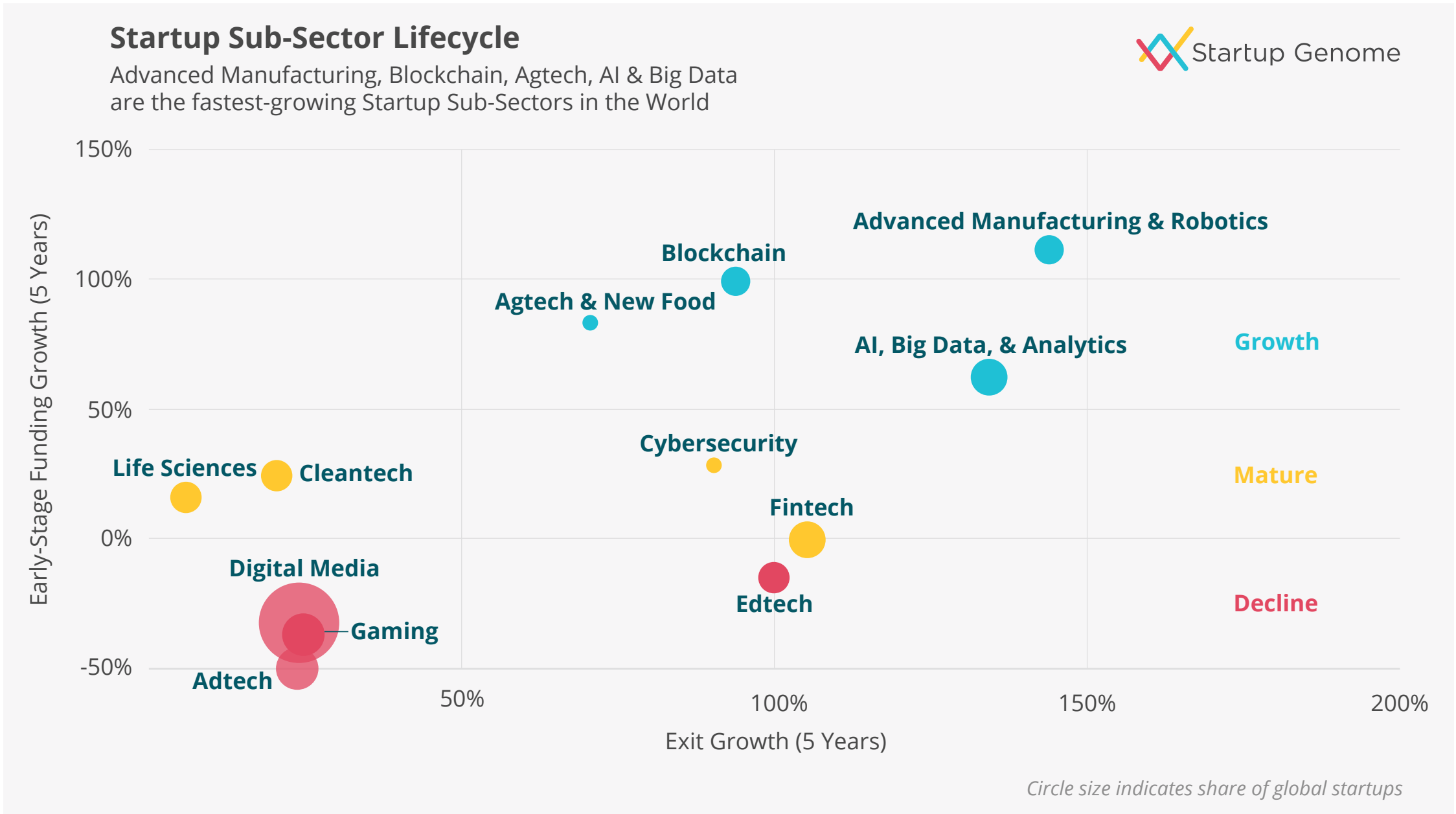
Early-Stage Funding Deals over 5-Years

- Advanced Manufacturing & Robotics (107.9%)
- Blockchain (101.5%)
- Agtech & New Food (88.8%)
- AI, Big Data, & Analytics (64.5%)

Top 4 declining startup sub-sectors

Early-Stage Funding Deals over 5-Years

- Adtech (47.9%)
- Gaming (40.4%)
- Digital Media (38.9%)
- Edtech (15.8%)



Understanding the Lifecycle of Startup Sub-Sectors

Since we published the first-ever startup sub-sector lifecycle model in 2018, there are three main things that have changed.

The first one is that some new sub-sectors continue to emerge, including Quantum Computing.

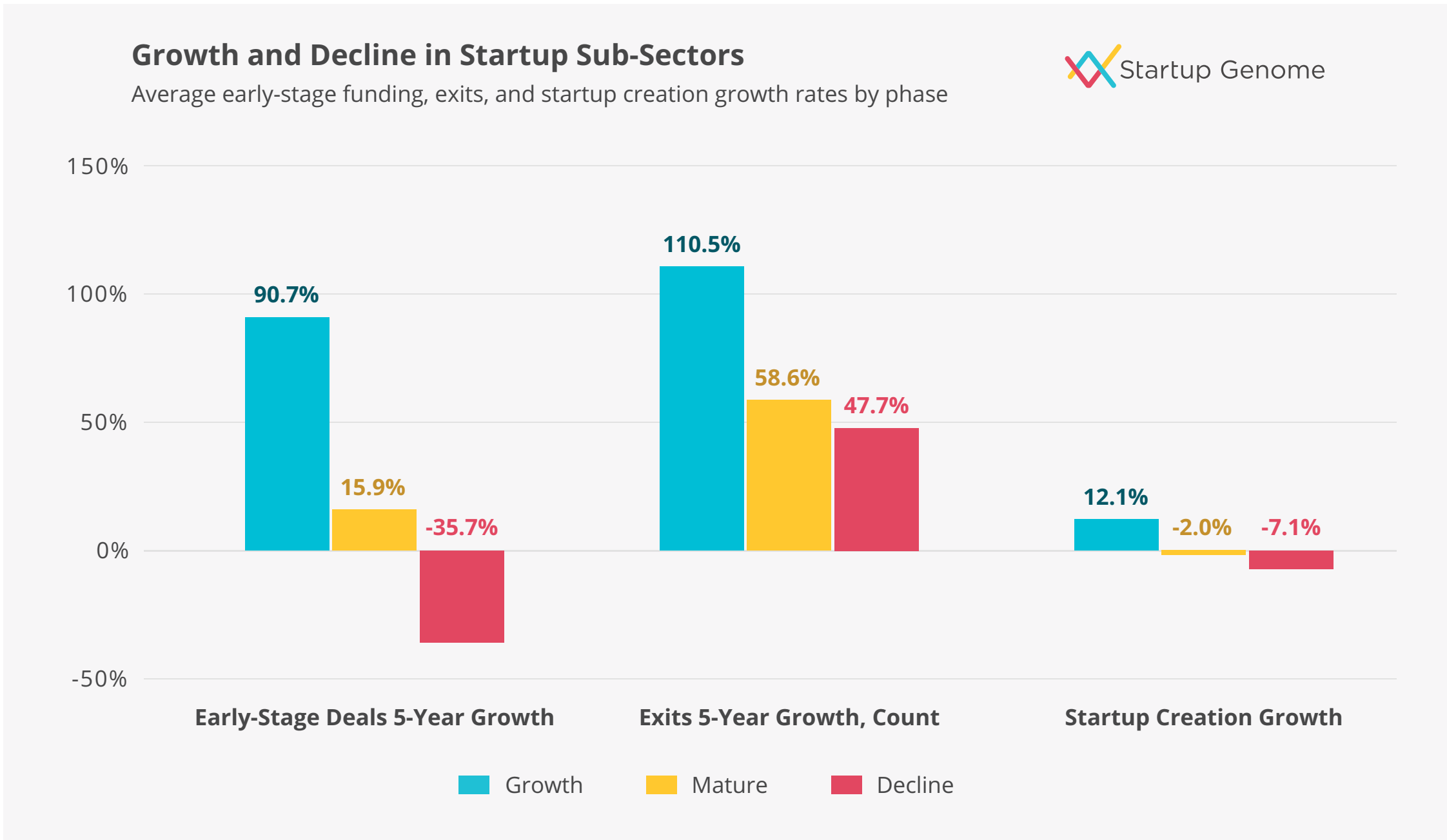
The second is that growth has slowed down for all startup sub-sectors — including high-performing ones. We are around the peak of the economic cycle, with capital is still flowing in, but growth rates are still strong yet smaller than they used to be.

The third one is that some sub-sectors have shifted. Fintech is late Maturity now and Edtech has gone from Mature to just on the edge of Decline.

To arrive at the Sub-Sector Lifecycle Model, we have done the most extensive research on the topic ever. We start with data covering over 1 million companies, 135 ecosystems, and over 400 partners. Every company, every exit, and every funding deal analyzed through a machine learning algorithm to assign them to startup sub-sectors; and in addition we run a proprietary global survey with over 10,000 startup founders and executives and interview more than 100 experts to get quantitative

and qualitative insights no other data has. Moreover, we partnered with Prof. David Rigby at UCLA to technology production and IP networks by studying over 1 million patents; and worked with Paris-based Hello Tomorrow to better understand Life Sciences specifically. For more information on our research methods, please see the Methodology section.

We present the results of this Startup Sub-Sector Lifecycle analysis on this section, covering 12 key sub-sectors — focusing on Growth, Mature, and Decline Phases, as emergent sub-sectors are still very small. Overall, Startup Sub-Sectors begin and evolve through four key lifecycle phases, described below:



Emergence. The first phase of the lifecycle is spurred by some sort of catalyst, with the sub-sector emerging and beginning to develop. The catalyst could be a new technological advance, a regulatory change, or even a shift in resource costs. Artificial Intelligence, for example, has existed as a research field since at least the 1950s. But only in the last decade or so have increases in computing power and big data storage — combined with open access to machine learning tools — created a sizeable Startup Sub-Sector, creating the opportunity for small teams to apply machine learning algorithms to solve more and more problems, resulting in growing startup activity.

Growth. The second phase occurs when a new sub-sector coalesces as something distinct and it grows. For instance, ten years ago, when people talked about technology use in education, they usually meant the presence of computers in classrooms. Today, Edtech refers to a huge set of startups and other organizations working to revolutionize education and quality using technology.

Maturity. In the third phase of the lifecycle, a sub-sector matures: startup creation and early-stage funding slow down, while exits and Series B+ funding rounds continue to be strong.

Decline. Finally, the sub-sector enters the decline phase. Early-stage funding drops with exits eventually follow-

ing suit. Not every sub-sector is destined to decline, of course. A new technological development within the sub-sector may open a new era of growth, just like a new product feature may reinvigorate a fading product. But without new developments, the original upstarts become incumbents, and the disruptors eventually get disrupted.

Metrics Definitions

Early-Stage Deals 5-Year Growth, Count

- Count of all early stage funding deals, growth from 2013-2014 to 2017-2018

Exits 5-Year Growth

- Count of all exits, growth from 2013-2014 to 2017-2018

Share of Global Startups

- As of 2018-2019

Startup Creation Growth

- Annualized growth in startup formations from 2010-2011 to 2017-2018

Why You Should Care About Startup Sub-Sectors

We cover startup sub-sectors as major part of this report for two main reasons:

1. Focus for Ecosystems

Identifying and building on local strengths is one of the main levers that policymakers and ecosystem builders can use to boost ecosystem performance. (Other levers, as we covered in our Ecosystem Strategy section of the 2018 Global Startup Ecosystem Report include focusing on milestones and tools relevant to Ecosystem Lifecycle Phase and addressing specific, quantified gaps in Ecosystem Success Factors.)

No small ecosystem can perform well and compete with places like Silicon Valley, London, Beijing, or New York across the board. But what they can do is be a hub of excellence in specific startup sub-sectors and use that advantage to build spillover effects that improve the ecosystem and the economy as a whole.

Take San Diego, the #3 ecosystem in the world for Life Sciences even though it is relatively small with only 1,000 to 1,400 tech startups — less than 10% the size of Silicon Valley and only 14% of the size of New York. That strength spilled over and helped San Diego become a top 30 global startup ecosystem despite its small size.

Frankfurt is a similar case. Although it is small, with only 300 to 500 startups, it is incredibly focused on Fintech. It has many Fintech accelerators and corporate startup innovation initiatives, about half of the VC funding in the ecosystem goes to the sub-sector, and the city is home to a very strong traditional financial industry with five Forbes 2000 companies in finance and the presence of the European Central Bank headquarters. That focus led to the largest German Fintech exit of all time taking place in the city (360T, for nearly \$800 million) and high ecosystem performance across many Success Factors.

Throughout this report, we cover in detail relative sub-sector strengths for over 50 ecosystems, as well as in our website at startupgenome.com.

2. Insights for Founders

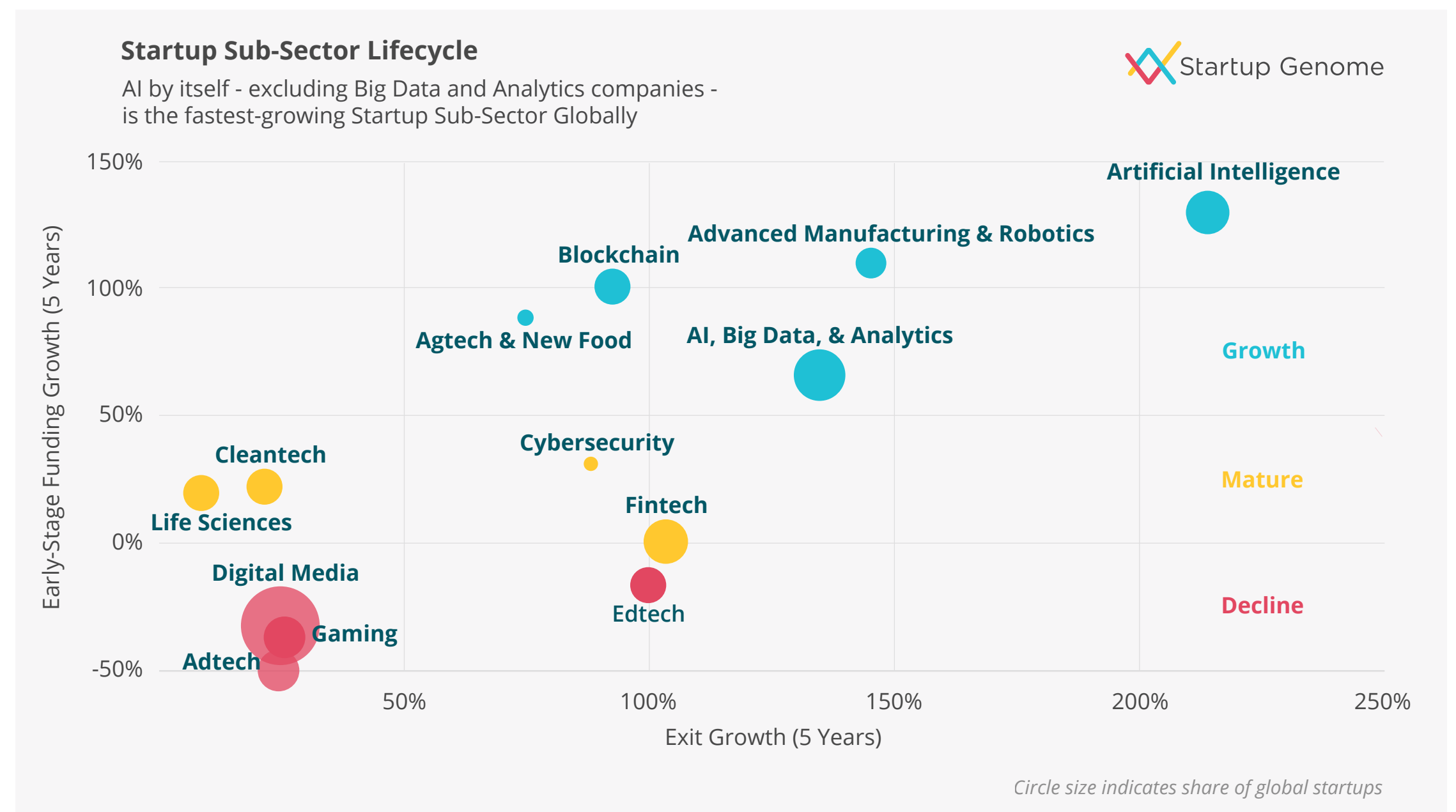
As a founder, knowing how your startup sub-sector of interest is growing — and which ecosystems have the biggest competitive advantage in them — can help you make better decisions. It tells you the places you should be considering networking or opening operations at (e.g., if you are Life Sciences founder in Europe, you would do well to make connections in London and Lausanne-Bern-Geneva) and it tells you about the funding and exit environment (e.g., if you need capital for a Gaming startup not overlapping with growth startup sub-sectors, be prepared for a tough funding environment and consider more bootstrapping).

Growth Sub-Sectors

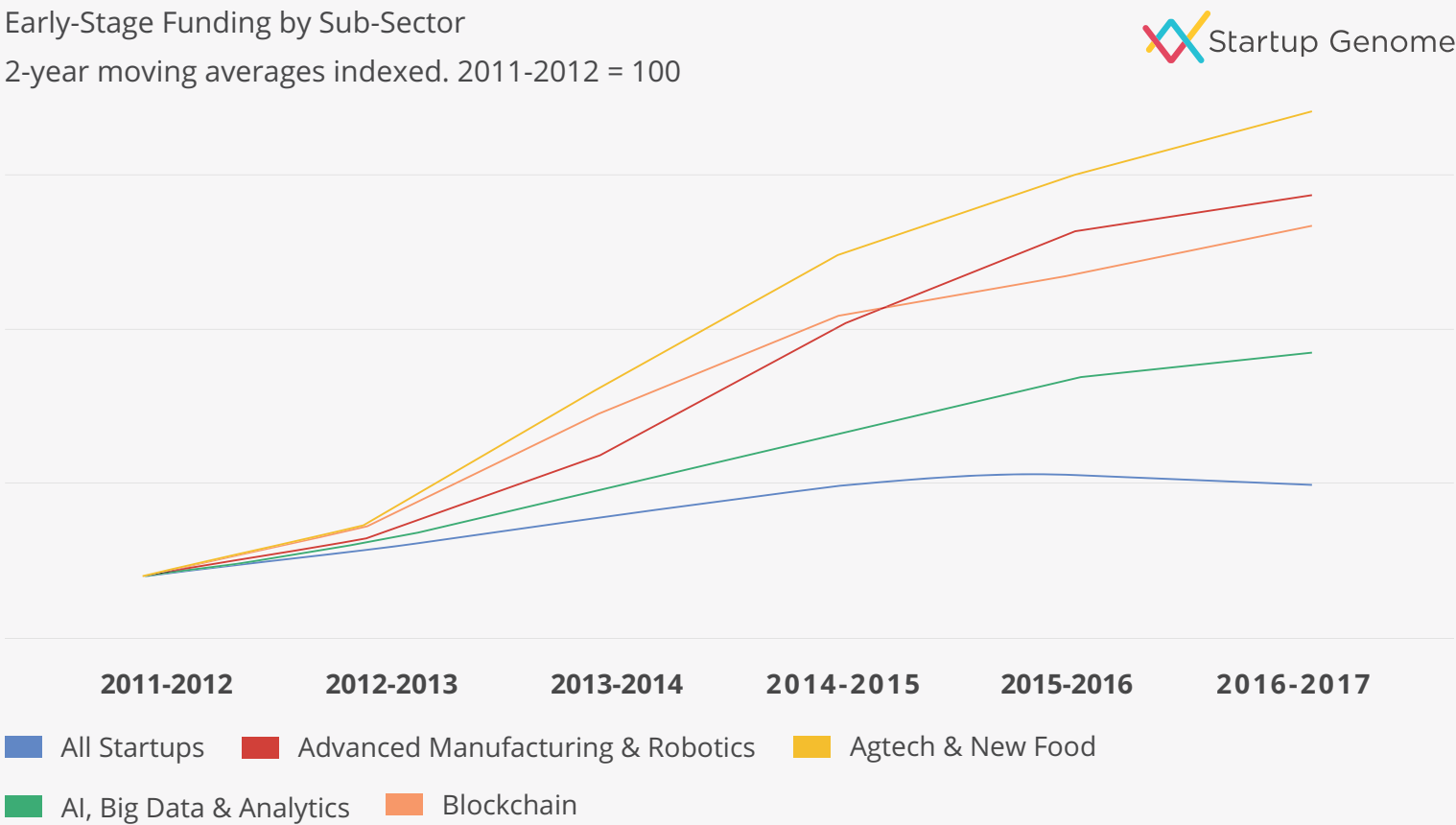
- Advanced Manufacturing & Robotics
- Blockchain
- Agtech & New Food
- AI, Big Data, & Analytics

The four Growth Sub-Sectors are increasing in size at an astounding pace, with an average 90.7 percent increase in early-stage funding deals over just 5 years, and 110.5 percent growth in exits.

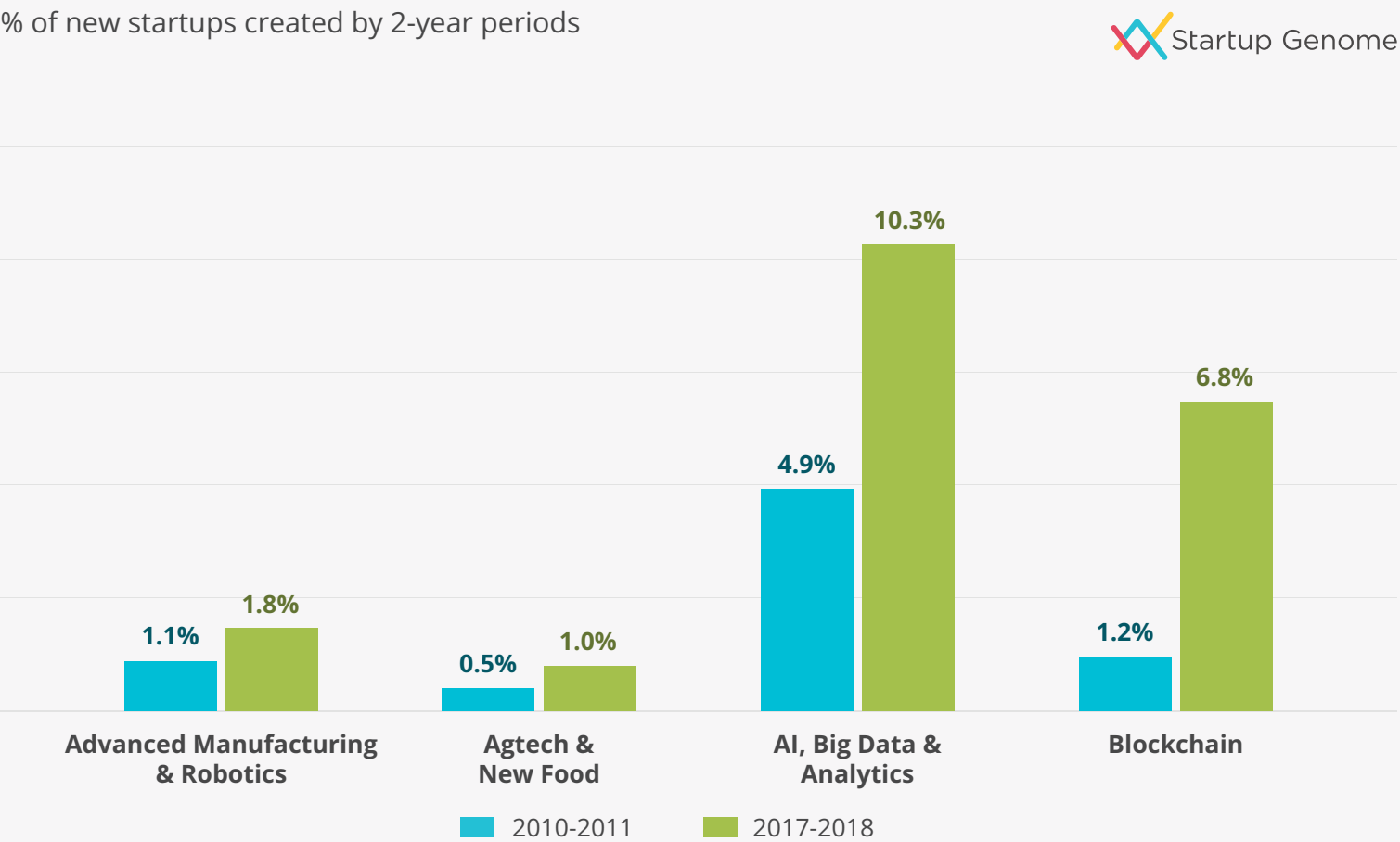
Among Growth-Phase sub-sectors AI, Big Data, & Analytics is the largest one, comprising 7.1% of all global startups. It also the sub-sector that is growing the slowest among its Growth-Phase peers. Nonetheless, if we separate AI by itself, excluding Big Data & Analytics startups from the cohort, we see that a standalone AI-sub-sector is growing about twice as fast as the AI, Big Data, & Analytics sub-sector as a whole.



Startup Sub-Sectors in the Growth Phase have increased 4x to 8x in Early-Stage Funding since 2011-2012, compared to 2.5x for all startups



Growth-Phase Sub-Sectors have all grown tremendously since 2010-2011. Agtech, although a small, has doubled in share of startups created, as has AI. Blockchain is 5x bigger now than it was then



Sub-Sector	Early Stage Deals 5-Year Growth	Exits 5-Year Growth, Count	Share of Global Startups	Startup Creation Growth
Advanced Manufacturing & Robotics	107.9%	143.8%	1.8%	6.6%
Blockchain	101.5%	93.9%	2.7%	23.9%
Agtech & New Food	88.8%	74.1%	0.8%	8.3%
AI, Big Data, & Analytics	64.5%	130.3%	7.1%	9.7%

Mature Sub-Sectors

- Cybersecurity
- Cleantech
- Life Sciences
- Fintech

Sub-Sector	Early Stage Deals 5-Year Growth	Exits 5-Year Growth, Count	Share of Global Startups	Startup Creation Growth
Cybersecurity	29.1%	87.3%	0.9%	3.6%
Cleantech	18.3%	26.2%	2.9%	-5.7%
Life Sciences	15.0%	15.0%	2.6%	-7.3%
Fintech	1.1%	105.8%	8.7%	1.5%

The four startup sub-sectors in the Mature Phase still grew a respectable 15.9% in early-stage funding and 58.6% in exits during the past five years. While this level of growth is sufficient to make them mature in terms of startup sub-sectors, these are figures most traditional industries would be envious of.

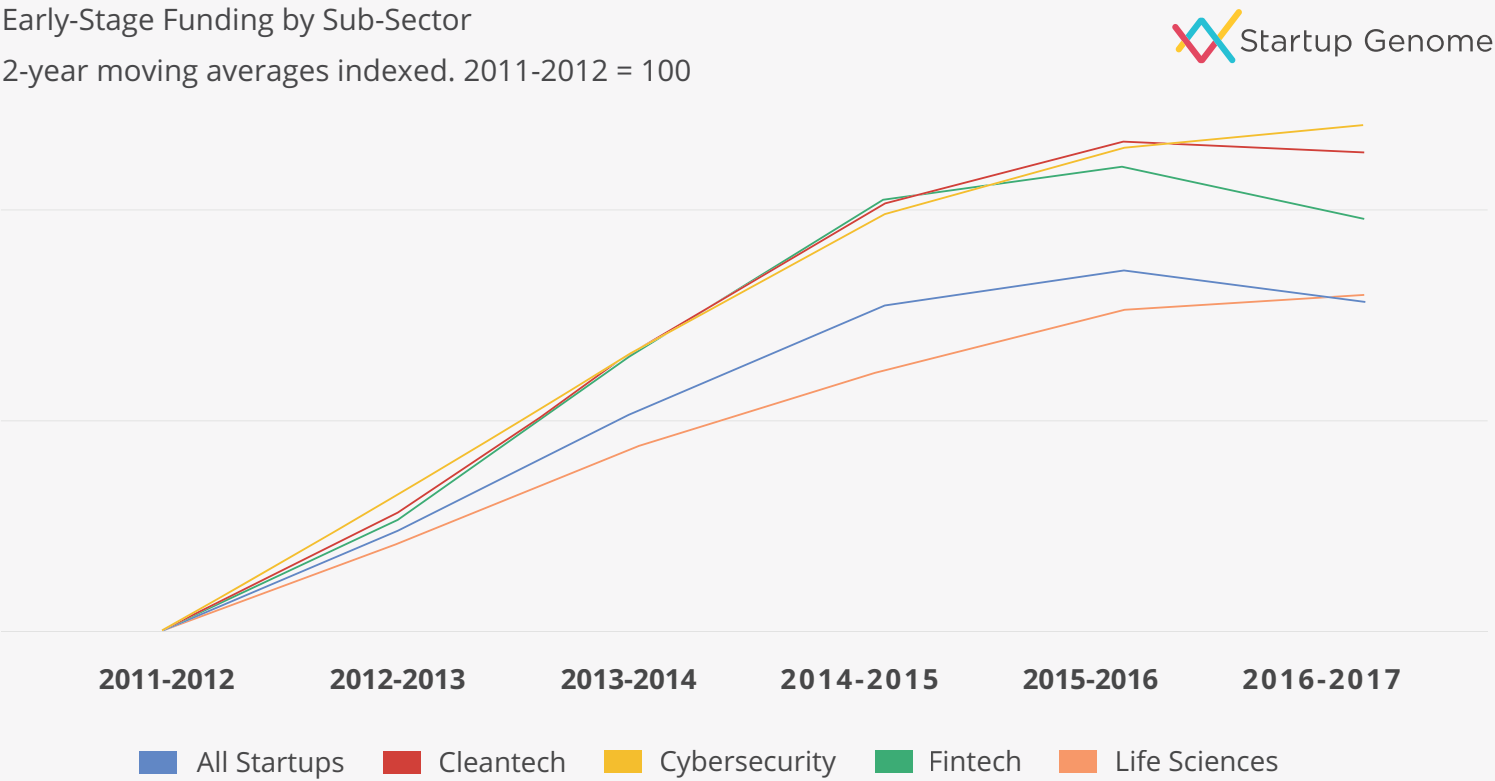
Fintech, an important startup sub-sector, shows two major signs of approaching a successful late Maturity: first, it has grown massively, and now nearly one of every 10 global startups is working in this sub-sector

(with the reminder that sub-sectors are not mutually exclusive — a startup might be in both Fintech and AI at the same time). Second, it still shows very strong performance and growth in terms of exits. This shows that while not as much money is coming for early-stage startups (later stage and mega rounds are another story), founders and investors are able to still exit in impressive numbers.

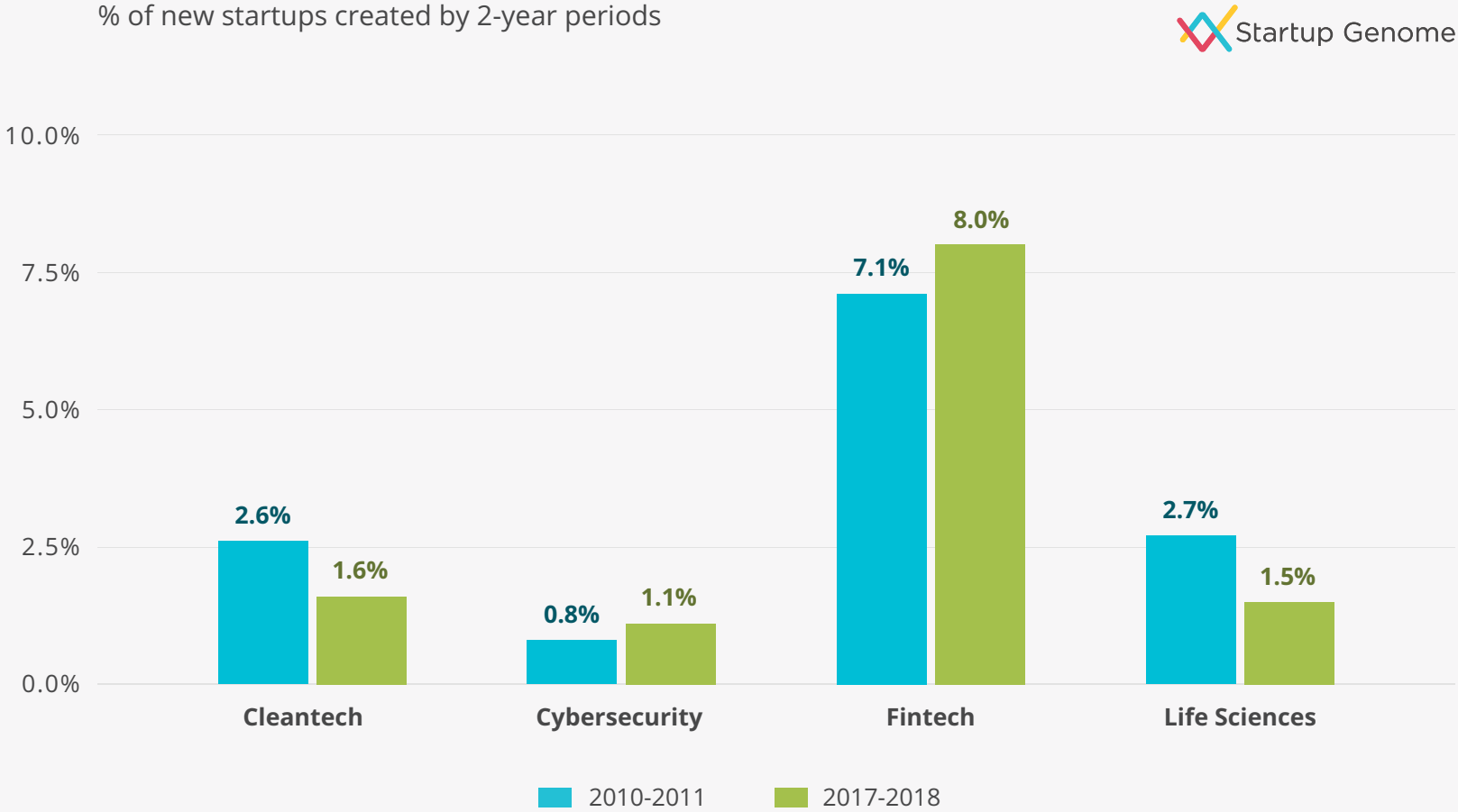
Interestingly, as we show on the chart below, Life Sciences and Cybersecurity are the only two startup

sub-sectors in the Mature Phase that have grown in the latest period. This could be a sign of renewed vigor for startups in these spaces.

Startup Sub-Sectors in the Mature Phase have increased 2.5x to 3.5x in Early-Stage Funding since 2011-2012, compared to 2.5x for all startups



Mature Phase Sub-Sectors have seen no significant change in share of startups overall



Decline Sub-Sectors

- Edtech
- Digital Media
- Gaming
- Adtech

Sub-Sector	Early Stage Deals 5-Year Growth	Exits 5-Year Growth, Count	Share of Global Startups	Startup Creation Growth
Edtech	-15.8%	99.1%	3.1%	0.9%
Digital Media	-38.9%	30.1%	20.7%	-7.5%
Gaming	-40.4%	31.7%	4.5%	-12.0%
Adtech	-47.9%	29.9%	4.2%	-9.8%

Sub-sectors in the Decline Phase are shrinking in terms of early-stage funding deals, although mega rounds and later funding rounds might still be happening. In addition, each one of them is still experiencing growth in exits, although they are under-performing the typical startup sub-sector.

The main change to this group since last year when we published the Global Startup Ecosystem Report in 2018 is in Edtech — a sub-sector that was in Mature Phase that now has edged towards Decline Phase. While exits

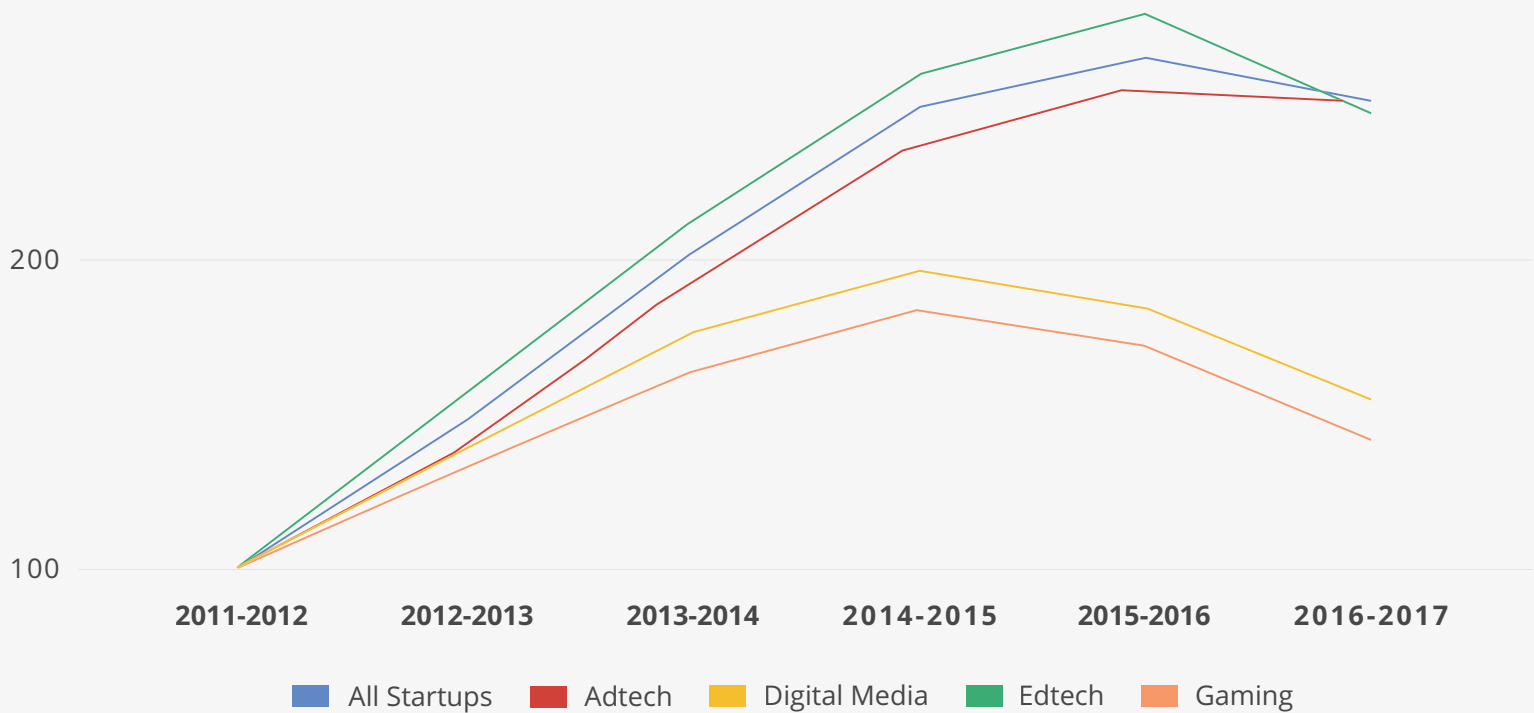
are still growing, early-stage funding deals — a key indicator of future potential from both founders and investors — are declining.

While these sub-sectors are declining overall, they still have meaningful presence and size, and can be renewed by new technologies — for example with the potential for VR and AR to rejuvenate Gaming.

Startup Sub-Sectors in the Decline Phase have increased 1.5x to 2.5x in Early-Stage Funding since 2011-2012, under-performing when compared to all startups as a whole

Early-Stage Funding by Sub-Sector
2-year moving averages indexed. 2011-2012 = 100

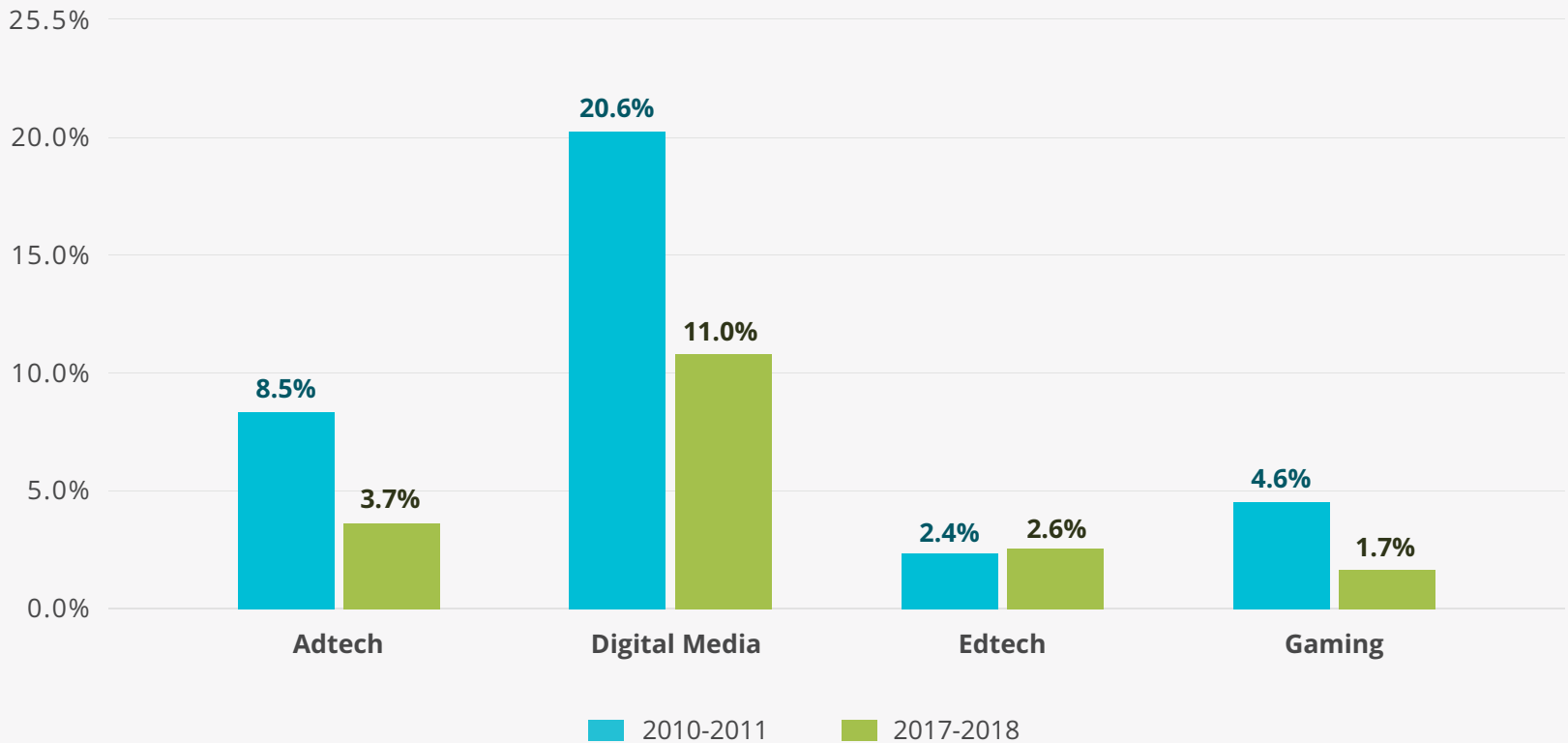
Startup Genome



Decline-Phase Startup Sub-Sectors are shrinking their importance on average, with the biggest drop in Gaming and Adtech by over half

% of startups created by 2-year periods

Startup Genome



Startup Sector and Sub-Sector Insights

57	2019 Life Sciences Ecosystem Ranking	71	Sub-Sectors by Lifecycle	75	Fintech
67	Artificial Intelligence Startup Ecosystem Ranking	71	Advanced Manufacturing and Robotics	76	Edtech
69	Blockchain Startup Ecosystem Ranking	72	Agtech and New Food	77	Gaming
		73	Cybersecurity	78	Adtech
		74	Cleantech		

2019 Life Sciences Ecosystem Ranking

In partnership with Hello Tomorrow

Co-Author

Prof. David Rigby

UCLA

The dynamics of building and growing a Life Sciences startup differ from other areas of technology. Time-lines are long: intensive research must be followed by rigorous clinical testing and repeated interactions with government. Funding amounts need to be larger, and the payoff period can be more uncertain and farther down the road than in software. Human capital, while important for a startup in any sector, is of overriding importance in Life Sciences because of the in-depth knowledge required.

Those dimensions — research, funding, talent, and knowledge — also mean that Life Sciences startups are highly dependent on their surrounding ecosystem. How well a regional startup ecosystem does in providing resources, and access to those resources, will shape the success of local startups.

Startup Genome, in collaboration with Hello Tomorrow, conducted an analysis of Life Sciences startup

ecosystems around the world. Where are Life Sciences startups enjoying the greatest access to necessary resources? Which resources matter the most to startup success in Life Sciences? And, where are the hotspots that founders and investors should look to for building a Life Sciences company?

Our deep analysis in Life Sciences of 60 ecosystems from 28 countries, along over 30 metrics, finds:

- Resources such as Knowledge and Infrastructure are widely distributed across ecosystems, yet Performance and Funding are not.
- A handful of U.S. ecosystems — led by Silicon Valley, Boston, and San Diego — dominate when it comes to startup success, growth, and exits.
- Relatively small ecosystems, such as Lausanne-Bern-Geneva and even San Diego, can outperform in Life Sciences because of a strong focus on the sector.

2019 Global Life Sciences Startup Ecosystem Ranking



	Ranking	Performance	Funding	Knowledge	Talent	Infrastructure	Policy
Silicon Valley	1	1st	1st	1st	1st	2nd	1st
Boston	2	1st	1st	3rd	1st	1st	1st
San Diego	3	1st	2nd	5th	2nd	3rd	2nd
New York City	4	1st	2nd	2nd	2nd	1st	1st
London	5	1st	2nd	1st	1st	1st	3rd
Los Angeles	6	2nd	3rd	4th	1st	3rd	2nd
Lausanne-Bern-Geneva	7	2nd	3rd	2nd	4th	3rd	3rd
Jerusalem-Tel Aviv	8	2nd	3rd	1st	5th	5th	3rd
Shanghai	9	2nd	4th	1st	4th	4th	4th
Washington, D.C.	10	3rd	3rd	5th	3rd	2nd	1st
Beijing	11	3rd	5th	1st	3rd	4th	4th
Chicago	12	3rd	4th	5th	3rd	2nd	1st
Seattle	13	4th	3rd	4th	3rd	4th	2nd
Munich	14	4th	5th	2nd	2nd	5th	3rd
Amsterdam-StartupDelta	15	4th	4th	4th	3rd	4th	4th
Paris	16	4th	4th	3rd	4th	3rd	3rd
Toronto-Waterloo	17	4th	5th	4th	1st	4th	3rd
Stockholm	18	5th	5th	3rd	4th	5th	5th
Singapore	19	5th	5th	5th	2nd	5th	5th
Austin	20	5th	5th	4th	4th	5th	2nd

Top ranked ecosystems classified in tiers from 1st (top) to 5th

What is Life Sciences?

Life Sciences is the sector concerned with diagnosing, treating, and managing diseases and conditions. This includes startups in Biotech, Pharma, and Medtech (also referred to as medical devices).

Some ecosystems do a better job of turning inputs — Knowledge, Talent, Infrastructure — into economically productive outputs, as measured by the number of startups and the success of those startups. Why?

Life Sciences Ranking

The top 20 Life Sciences ecosystems are displayed in the accompanying table. Within the top 20, we categorized ecosystems into different tiers based on their relative scores (see box for more detail). Ecosystems are scored and ranked on six Success Factors, which are broken down and explained below.

These 20 regions outperform ecosystems from the rest of the world in providing Life Sciences startups with well-resourced environments in which to succeed.

Ecosystems in the United States dominate the ranking, with six spots in the top 10 and nine out of the top 20. European ecosystems (including Jerusalem-Tel Aviv) account for seven of the top 20, while China's two main

ecosystems — Shanghai and Beijing — rank #9 and #11, respectively. The Life Sciences ecosystem in London includes Oxford and Cambridge.

Evident in the overall ranking, and as is explored below, there is wide variation across some Success Factors but a tighter distribution on others. The mostly strongly correlated Success Factors with overall scoring are Performance and Funding — this means that startup success and the availability of early-stage funding are highly concentrated, especially in Tier 1 ecosystems. By contrast, lower-ranked ecosystems such as Munich and Singapore perform well in Knowledge and Talent, respectively. Silicon Valley and San Diego score comparatively low on Infrastructure.

Interestingly, two ecosystems that are in the top 20 for Life Sciences are not in our overall top 20 ecosystem ranking: Lausanne-Bern-Geneva and Munich.

Now, we look at each individual Success Factor in our analysis and how ecosystems compare to each other.

Success Factor Highlights

Distance to Frontier: Understanding the Scores

For each Sub-Factor inside the Success Factors we present a distance to frontier score, where 10 is the maximum value for that metric across the ecosystems we studied and 0 is the minimum value. For the factors with the most skew, Performance and Funding, we calculated a log of the underlying value before transforming it into a score between 0 and 10.

Performance

Key Findings on Performance

- The overall top three ecosystems — Silicon Valley, Boston, San Diego — boast the best performance in terms of number and focus of Life Sciences startups. They are followed closely by two relatively small ecosystems, Lausanne-Bern-Geneva and Jerusalem-Tel Aviv, and Shanghai.
- Exits are much more skewed than Startup Output, showing that only a handful of Life Sciences ecosystems are (so far) generating the outputs necessary for continued growth. Silicon Valley and Boston outpace the rest of the top 20 on Exits.
- Life Sciences unicorns include 23andMe (Silicon Valley), Ginkgo Bioworks (Boston), Samumed (San Diego), and Oxford Nanopore Technology (London).

	Performance	
	Startup Output	Exits
Silicon Valley	10	10
Boston	10	9
San Diego	10	6
New York City	8	5
London	7	3
Los Angeles	7	3
Lausanne-Bern-Geneva	9	2
Jerusalem-Tel Aviv	9	2
Shanghai	9	2
Washington, D.C.	7	2
Beijing	8	2
Chicago	6	2
Seattle	6	2
Munich	6	2
Amsterdam-StartupDelta	7	2
Paris	6	2
Toronto-Waterloo	5	2
Stockholm	5	2
Singapore	4	2
Austin	4	2

The Performance Success Factor Assesses:

- **Startup Output** — this encompasses both the overall number of Life Sciences startups in an ecosystem and the share of overall Startup Output that Life Sciences startups account for. The latter metric captures Focus, and is described in more detail below.
- **Exits** — the number and value of exits (public offerings and acquisitions) over \$1 billion and \$50 million.
- **Growth Stage Success** — the number of Life Sciences startups with valuations over \$1 billion.

In addition to the sheer number of startups and exits, we also look at the extent to which a startup ecosystem is focused on Life Sciences. Silicon Valley tops both our overall and Life Sciences rankings in part because it is a massive startup ecosystem, hosting over 15,000 startups and a huge cluster of investors. Likewise, New York City and London are enormous urban regions. While these ecosystems excel in many sub-sectors, they don't necessarily specialize in any one. In Silicon Valley, according to our calculations, 3.8% of startups are in Life Sciences; in New York City and London, the share is just above 2%.

As shown in the accompanying table, several Life Sciences ecosystems perform well because they have dense populations of startups in this sector. In terms of overall ecosystem size, places like San Diego, and

	Focus		
	Ranking	Ecosystem Size	% of startups in Life Sciences
Silicon Valley	1	10	3.8%
Boston	2	7	8.3%
San Diego	3	5	11.2%
New York City	4	9	2.2%
London	5	8	2.1%
Los Angeles	6	8	2.1%
Lausanne-Bern-Geneva	7	5	9.1%
Jerusalem-Tel Aviv	8	7	7.5%
Shanghai	9	7	4.8%
Washington, D.C.	10	7	4.4%
Beijing	11	9	2.8%
Chicago	12	7	2.0%
Seattle	13	6	3.5%
Munich	14	4	6.0%
Amsterdam-StartupDelta	15	7	4.2%
Paris	16	7	2.8%
Toronto-Waterloo	17	7	2.4%
Stockholm	18	5	3.7%
Singapore	19	7	1.8%
Austin	20	6	2.1%

Lausanne-Bern-Geneva are in the middle of the pack. But they have the highest shares of startups in Life Sciences. This focus allows the ecosystems to overcome other relative deficits — Lausanne-Bern-Geneva, for example, is a Tier 4 ecosystem in Talent.

This is the first clue in our attempt to answer the question posed above: why are some places apparently better at turning inputs into economic outputs in Life Sciences, independent of ecosystem size? Because their startup ecosystems have a high relative focus on Life Sciences.

Funding

Key Findings on Funding

- Investor quality is evenly distributed across the top 20 ecosystems, with only a few places experiencing a dearth of Life Sciences investors.
- Actual investment is highly skewed: Silicon Valley and Boston are far ahead of other ecosystems. These two regions alone had over \$30 billion invested in early-stage Life Sciences startups over the past 5 years, compared to a combined \$23 billion in early-stage funding for the other 18 ecosystems. Note that these values exclude later stage investments (Series B and beyond).
- Despite that concentration, Shanghai had the



	Funding	
	Access	Quality
Silicon Valley	10	10
Boston	8	10
San Diego	4	9
New York City	4	10
London	3	10
Los Angeles	2	10
Lausanne-Bern-Geneva	2	7
Jerusalem-Tel Aviv	3	7
Shanghai	2	9
Washington, D.C.	2	8
Beijing	2	8
Chicago	2	8
Seattle	2	9
Munich	2	5
Amsterdam-StartupDelta	2	9
Paris	2	8
Toronto-Waterloo	2	8
Stockholm	2	3
Singapore	2	9
Austin	2	5

highest average deal size, while San Diego and Lausanne-Bern-Geneva also had fairly high average deals.

- Singapore, Amsterdam, and Seattle all enjoy the presence of experienced investors who give not only capital but also wisdom and guidance to Life Sciences startups.

The Funding Success Factor Assesses:

- Access** — the amount of early-stage funding and number of early-stage deals (seed and Series A) in an ecosystem.
- Quality** — measured by the number of local Life Sciences investors (regardless of size and those with over \$100 million in funds size), experience of investors (average years of experience and exits ratio), and activity of investors (percentage of active investors in past 12 months and number of new investors).

Knowledge

Life Sciences startups often emerge from a strong base of knowledge. This knowledge emerges from dedicated research and then codification and protection in patents, which help provide a competitive edge for companies. Yet as discussed below, Life Sciences Knowledge in an ecosystem must be joined with other Success Factors to generate performance.

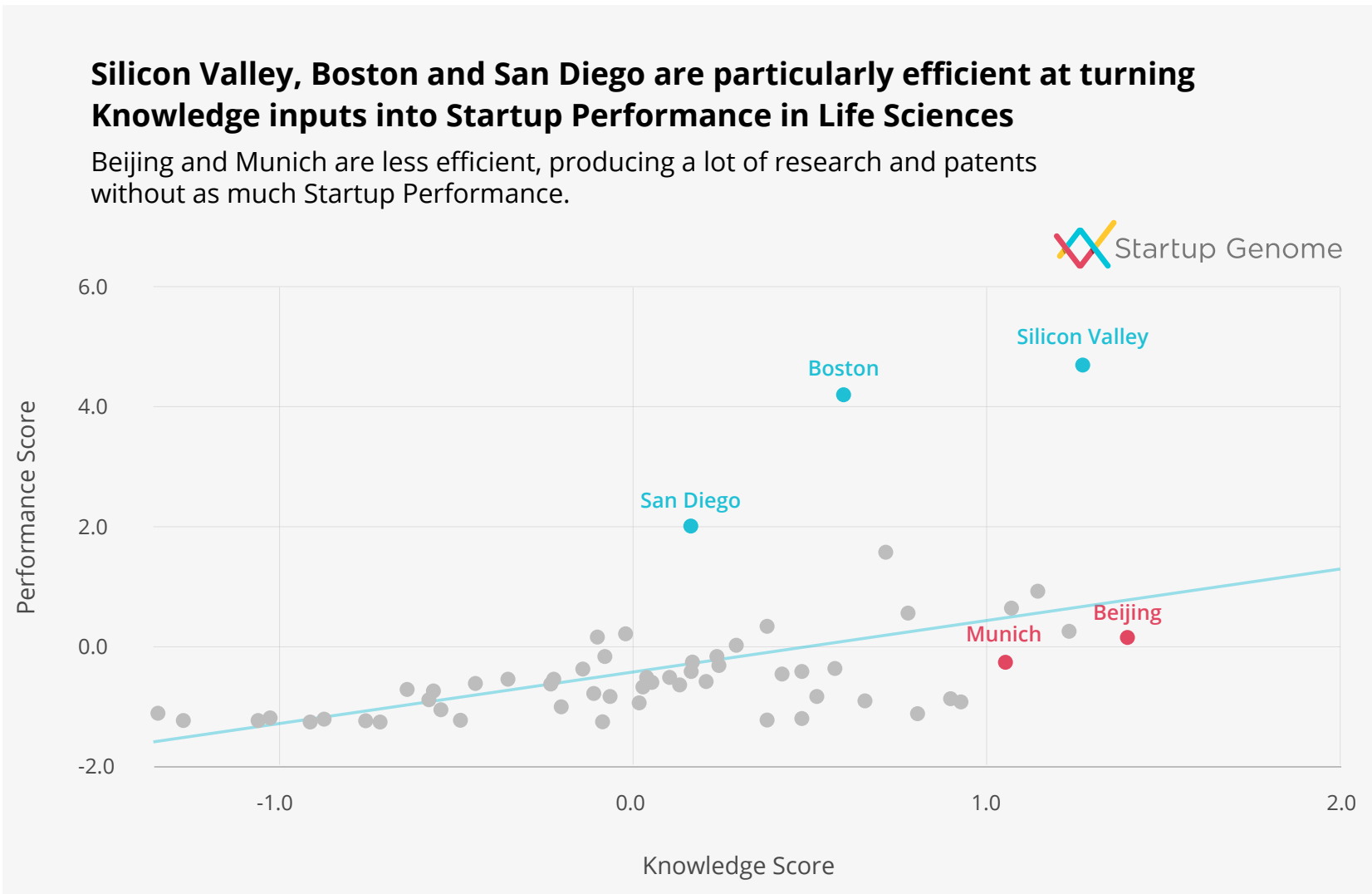
Key Findings on Knowledge

- Every top 20 ecosystems benefits from a strong base of Life Sciences research in their countries: with American and German ecosystems producing and benefiting from high-quality, high-impact research in this area.
- Patent quality is also well-distributed, but there are clear leaders. Beijing and Shanghai are two of the top three ecosystems in patents, and Jerusalem-Tel Aviv is also in the top tier here.

The Knowledge Success Factor Assesses:

- **Research** — based on the H-index, a measure of publication impact, this metric looks at the production of Life Sciences research at the country level.
- **Patents** — the volume, complexity, and potential of patents created in the ecosystem.

Knowledge, however, is insufficient for startup success and ecosystem performance. Creating a patent requires different skills than taking it to market, and high-impact research does not remain in one particular locale. As a result, we find some ecosystems showing more efficiency into turning Knowledge inputs into startup activity.



	Knowledge	
	Patents	Research
Silicon Valley	10	10
Boston	8	10
San Diego	7	10
New York City	8	10
London	9	10
Los Angeles	8	10
Lausanne-Bern-Geneva	9	8
Jerusalem-Tel Aviv	10	5
Shanghai	10	5
Washington, D.C.	6	10
Beijing	10	5
Chicago	6	10
Seattle	7	10
Munich	9	10
Amsterdam-StartupDelta	8	7
Paris	8	9
Toronto-Waterloo	7	9
Stockholm	9	6
Singapore	8	3
Austin	8	10

Talent

Knowledge is one ingredient in Life Sciences success, but Talent is wholly separate: a person or team of people must translate knowledge into a commercial-izable idea and transfer that idea into a startup. A successful startup must have the right people to be able to absorb and test and develop the knowledge and idea.

Key Findings on Talent

- The overall top ecosystems for Talent in Life Sciences are Boston, Silicon Valley, Los Angeles, London, Singapore, and Toronto-Waterloo.
- While Seattle and San Diego compare well with others on the Quality of their local talent, they have relatively lower scores on Access. This is a function of the size of their talent pools. It likely also reflects the fact that top-tier research organizations in these ecosystems (such as the Salk Institute in San Diego, and the Allen Institute and Fred Hutchinson Cancer Research Center in Seattle) are freestanding institutes, not traditional universities.

The Talent Success Factor Assesses:

- **Access** — a count of STEM students and graduates, and Life Sciences universities and degree programs in an ecosystem.



	Talent	
	Access	Quality
Silicon Valley	9	10
Boston	10	10
San Diego	5	10
New York City	10	7
London	10	9
Los Angeles	9	9
Lausanne-Bern-Geneva	9	7
Jerusalem-Tel Aviv	9	4
Shanghai	10	6
Washington, D.C.	6	9
Beijing	10	6
Chicago	9	8
Seattle	2	10
Munich	7	9
Amsterdam-StartupDelta	9	7
Paris	10	6
Toronto-Waterloo	8	9
Stockholm	8	7
Singapore	7	10
Austin	5	7

- **Quality** — a function of Life Sciences quality at local universities and their programs.

Infrastructure

The distribution of Talent across ecosystems is not as skewed as Performance and Funding, but it is tighter than Knowledge.

Knowledge and Talent are two important pieces of the Life Sciences foundation in an ecosystem: well-educated researchers producing patents and publications are a critical input for a Life Sciences ecosystem. But those individuals need to be surrounded by an Infrastructure that supports innovation, and they need advisors, partners, and places to carry out testing.

Key Findings on Infrastructure

- Only a handful of ecosystems have dedicated organizations for Life Sciences startups, and the top tier of these are found in the United States.
- The four largest research funders for 2018 were the National Institutes of Health (U.S.), the European Commission, the European Research Council, and the Engineering and Physical Sciences Research Council (United Kingdom). As with Knowledge, this results in a fairly wide distribution of R&D expenditures across ecosystems.

	Infrastructure		
	Accelerators & Incubators	Research Grants	R&D Anchors
Silicon Valley	10	9	7
Boston	8	9	10
San Diego	5	8	6
New York City	10	9	10
London	6	10	10
Los Angeles	7	8	6
Lausanne-Bern-Geneva	7	8	5
Jerusalem-Tel Aviv	8	5	2
Shanghai	2	6	6
Washington, D.C.	8	9	6
Beijing	2	6	7
Chicago	10	8	7
Seattle	2	8	4
Munich	2	6	3
Amsterdam-StartupDelta	2	7	5
Paris	9	8	6
Toronto-Waterloo	2	9	6
Stockholm	2	8	3
Singapore	7	2	4
Austin	2	5	2

The Infrastructure Success Factor Assesses:

- **Accelerators and Incubators** — the presence of Life Sciences-specific organizations that can facilitate commercialization and innovation.
- **Research Grants** — sum of Life Sciences research grants received in an ecosystem.
- **R&D Anchors** — count of research hospitals, corporate R&D locations, and other research organizations.

Policy

Compared to startups in software, Life Sciences startups are more affected by public policy because of the need to undergo clinical trials and receive government approval. The policy components identified here are measured at the national level, rather than the ecosystem level.

Key Findings on Policy

- In general, the United States and Canada offer the best regulatory environments for Life Sciences startups. In recent years, the U.S. Food and Drug Administration (FDA) has sought to balance public protection and innovation, although there are still meaningful complaints from industry about FDA bureaucracy.
- While the United States continues to lead in overall R&D, China has been rapidly increasing its R&D

	Policy		
	Public R&D spending	Clinical Trial Authorization	Commercialization of IP assets
Silicon Valley	10	10	10
Boston	10	10	10
San Diego	10	10	10
New York City	10	10	10
London	8	5	8
Los Angeles	10	10	10
Lausanne-Bern-Geneva	8	7	9
Jerusalem-Tel Aviv	8	7	9
Shanghai	10	2	2
Washington, D.C.	10	10	10
Beijing	10	2	2
Chicago	10	10	10
Seattle	10	10	10
Munich	9	7	8
Amsterdam-StartupDelta	8	7	8
Paris	9	2	8
Toronto-Waterloo	8	10	9
Stockholm	8	5	8
Singapore	7	5	8
Austin	10	10	10

spending — here, to the benefit of Life Sciences startups in Shanghai and Beijing.

Our Policy Success Factor Assesses:

- **Public R&D Spending** — the value of public R&D expenditures.
- **Clinical Trial Authorization** — count of days required to authorize clinical trials, a measure of speed in the regulatory environment for Life Sciences.
- **Commercialization of IP Assets** — indicator of how much the policy environment encourages the commercialization of tangible IP.

What Makes a Successful Life Sciences Ecosystem?

Focus, Funding, and a Strong Foundation.

So why do certain places, despite a strong base of Knowledge, fall behind other regions in terms of their Life Sciences ecosystem? And why do other places, despite an apparent shortcoming in Talent or Infrastructure, have high-performing Life Sciences startup ecosystems? San Diego is the third-ranked ecosystem overall in Life Sciences, but in Tier 5 in Knowledge, mostly due to a low comparative score on patents.

Chicago and Washington, D.C. are also Tier 5 ecosystems in Knowledge, but rank #12 and #10, respectively, overall. Jerusalem-Tel Aviv is grouped in Tier 5 on both Talent and Infrastructure, but ranks #8 overall. By contrast, Beijing ranks #11 overall, and is Tier 1 in Knowledge and Tier 3 in Performance.

When studying these ecosystems together, some patterns became clear.

First, a relative focus on Life Sciences can outweigh shortcomings. The share of Life Sciences startups in ecosystems such as Boston, San Diego, Jerusalem-Tel Aviv, and Lausanne-Bern-Geneva is much higher than in most other places. We see this in other areas as well: the predominance of Fintech startups in the otherwise small ecosystem of Frankfurt boosts the region's economic performance. A dense population of startups in one sector facilitates the movement of ideas and people. This can compensate for, say, a low score on Infrastructure and facilitate startup success.

Second, funding matters enormously. Building and growing a Life Sciences startups requires heavy investment over long periods of time. Those ecosystems where Life Sciences funding is available and accessible — and complemented by investor experience — are also the highest performing in terms of economic outcomes.

Lastly, a strong foundation matters, but people are the most important piece of that foundation. No matter how much research funding there might be, no matter how many research organizations there are, if the Talent pipeline is dry, the transfer and commercialization of ideas into startups simply won't happen. On its own, however, Talent is an insufficient Success Factor for overall Life Sciences ecosystem performance. A strong focus on Life Sciences can maximize even a small Talent pool, and it must be joined with ample Funding.

Life Sciences

Startup Output

Global Share of Startups **2.6%**

Global Average: 5.2%

Startup Growth **-7.3%**

Exits

Exit Value Growth **98.1%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **149.7%**

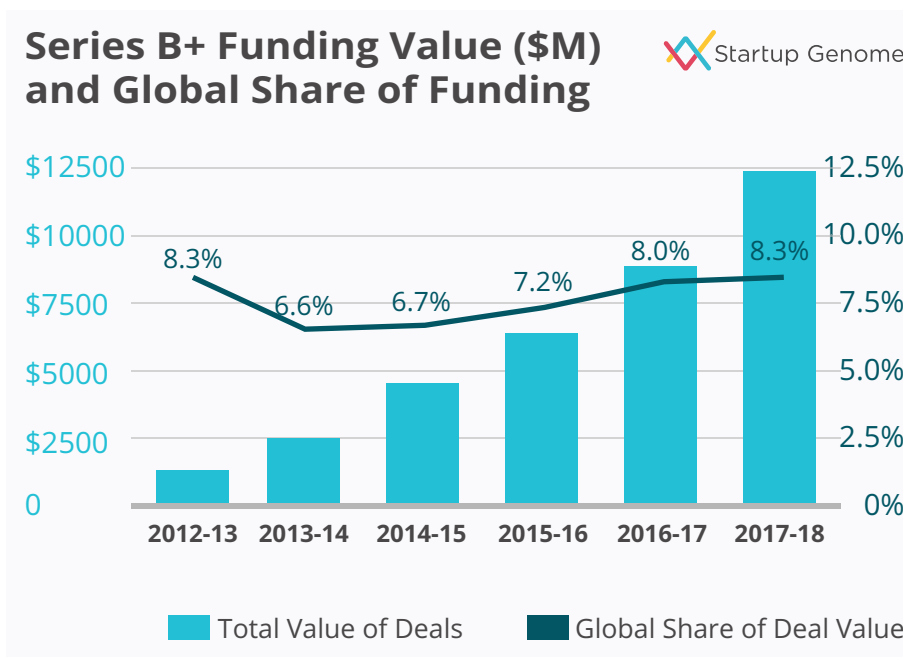
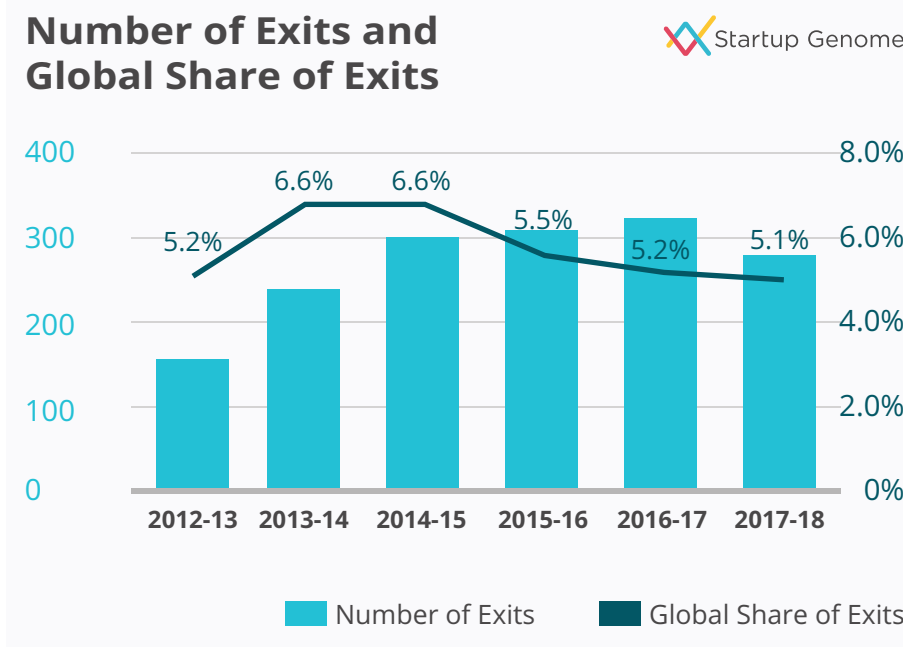
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$739 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$5 million**

(2018) Global Median: \$3.4 million



Key Startups and Exits

- Flatiron Health (New York City) was acquired by Roche for \$2.1 billion in 2018
- Moderna (Boston) launched the largest Biotech IPO in the world with a valuation of \$7.5 billion in 2018

Ecosystems to Watch





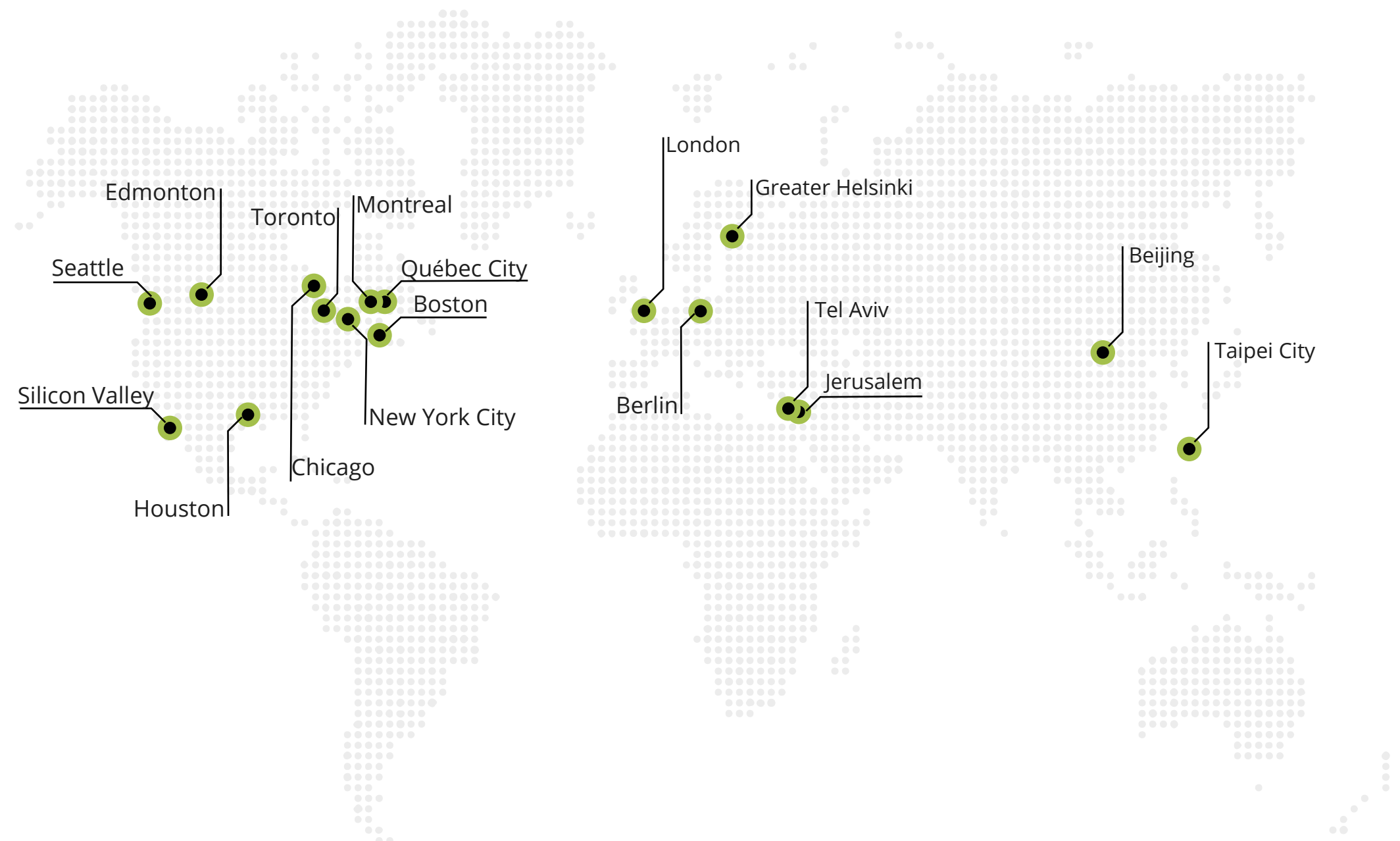
Artificial Intelligence Startup Ecosystem Ranking

We ranked 135 global startup ecosystems across six Success Factors in Artificial Intelligence to identify the top performing ones.

See startupgenome.com for our latest research on the topic and the Methodology section for details.

Ecosystems to watch

	Ranking	Performance	Funding	Experience	Knowledge	Talent	Focus
Silicon Valley	1	10	10	10	10	9	9
Beijing	2	9	9	8	10	9	9
Tel Aviv	3	7	8	7	10	9	10
Boston	4	8	8	8	9	10	4
London	5	8	9	8	9	10	2



Artificial Intelligence

Startup Output

Global Share of Startups **7.1%**

Global Average: 5.2%

Startup Growth **9.7%**

Exits

Exit Value Growth **126.1%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **192.9%**

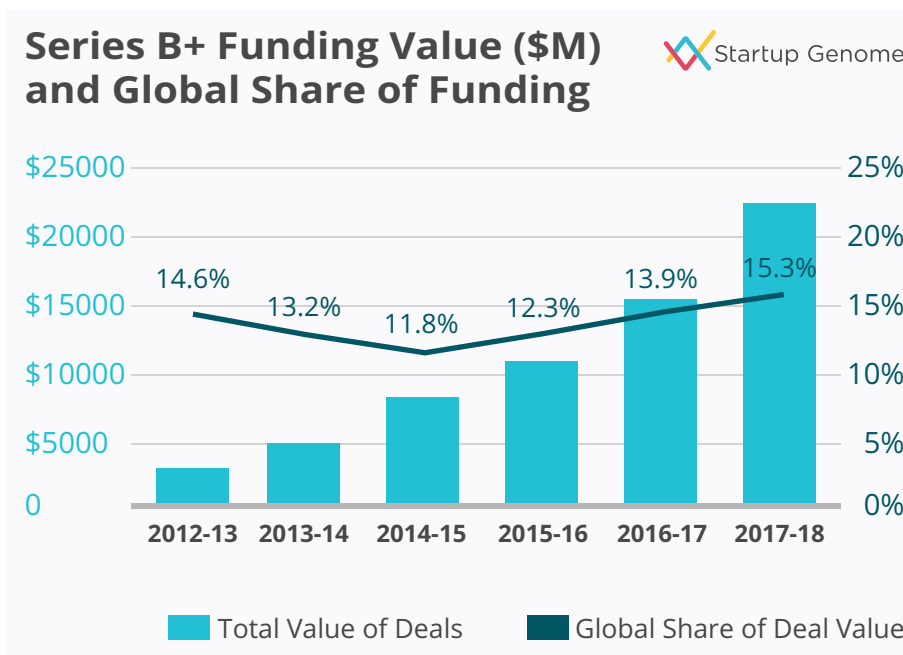
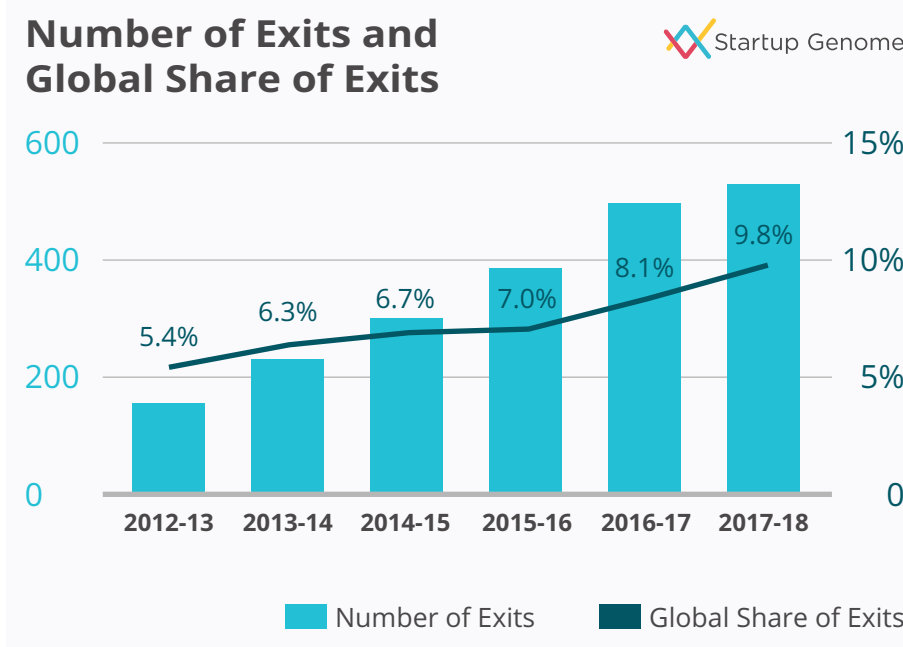
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$680 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$4 million**

(2018) Global Median: \$3.4 million



Key Startups and Exits

- Datorama (New York City) was acquired for \$800 million in 2018
- Bytedance (Beijing) closed \$3 billion of funding in 2018 at a valuation of \$75 billion



Blockchain Startup Ecosystem Ranking

We ranked 135 global startup ecosystems across six Success Factors in Blockchain to identify the top performing ones.

See startupgenome.com for our latest research on the topic and the Methodology section for details.

Ecosystems to watch

	Ranking	Performance	Funding	Experience	Knowledge	Talent	Focus
Silicon Valley	1	10	10	9	10	10	4
London	2	9	8	10	9	9	6
New York City	3	9	9	7	9	10	4
Singapore	4	8	8	5	9	9	10
Toronto-Waterloo	5	8	5	8	10	9	4



Blockchain

Startup Output

Global Share of Startups **2.7%**

Global Average: 5.2%

Startup Growth **23.9%**

Exits

Exit Value Growth **269.3%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **231.4%**

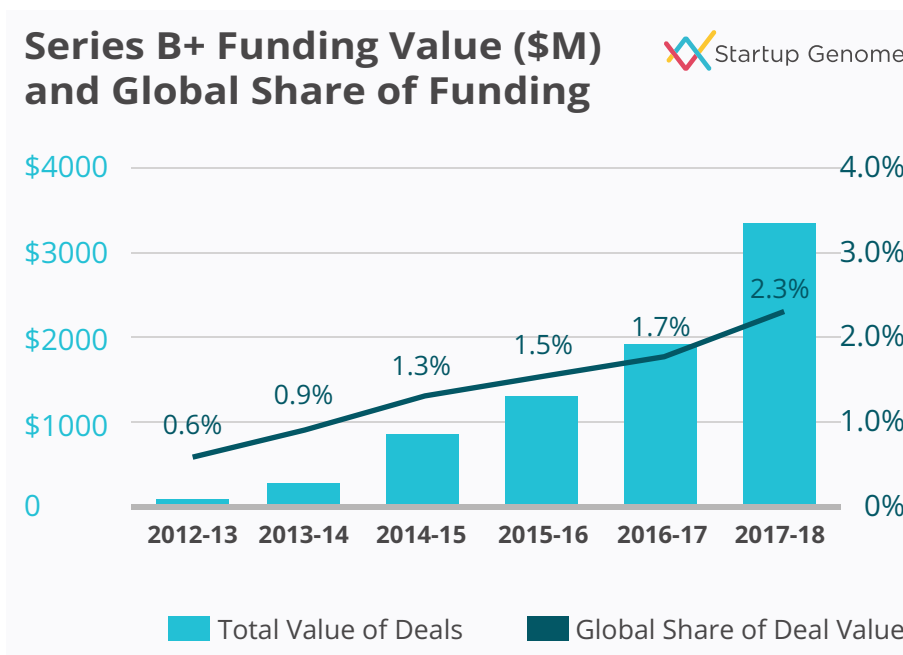
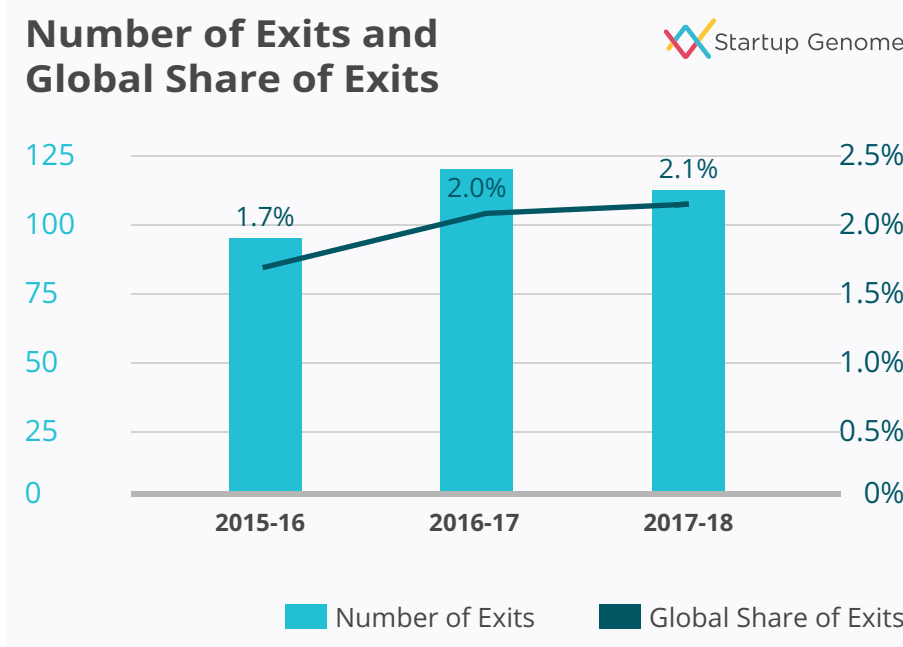
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$560 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$3.3 million**

(2018) Global Median: \$3.4 million



Key Startups and Exits

- Poloniex (Boston) acquired for \$400 million in 2018
- Coinbase (Silicon Valley Unicorn) raised \$300 million in 2018 in a Series E round, followed by a \$21 million Series F round



Advanced Manufacturing and Robotics

Startup Output

Global Share of Startups **1.8%**

Global Average: 5.2%

Startup Growth **6.6%**

Exits

Exit Value Growth **230.3%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **417.0%**

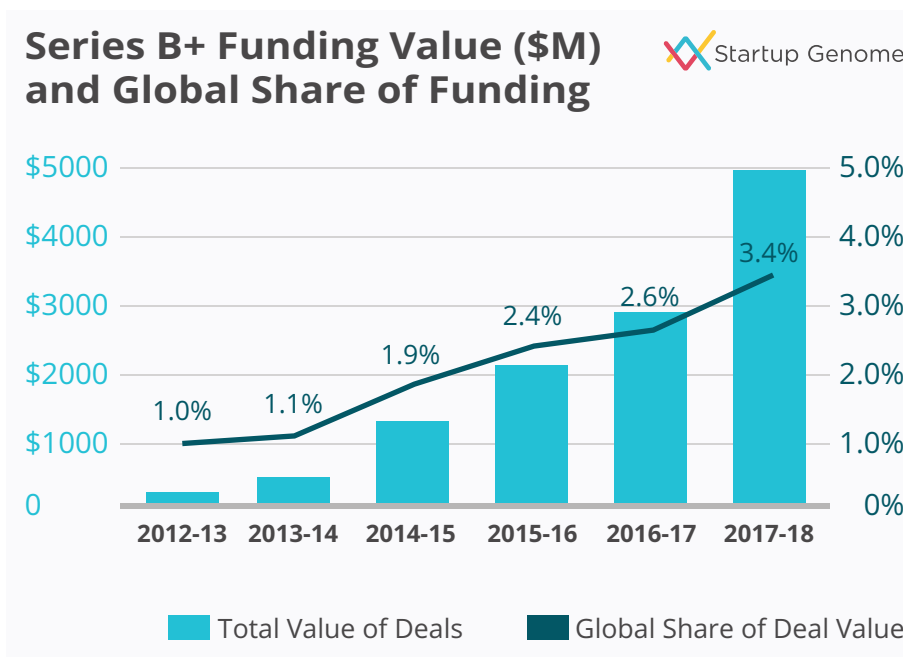
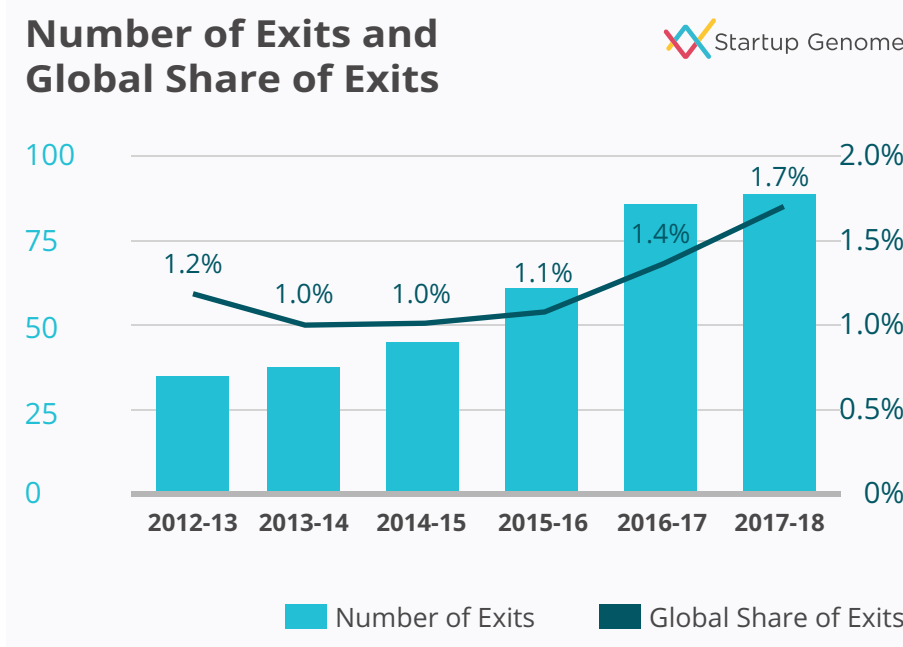
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$650 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$4.5 million**

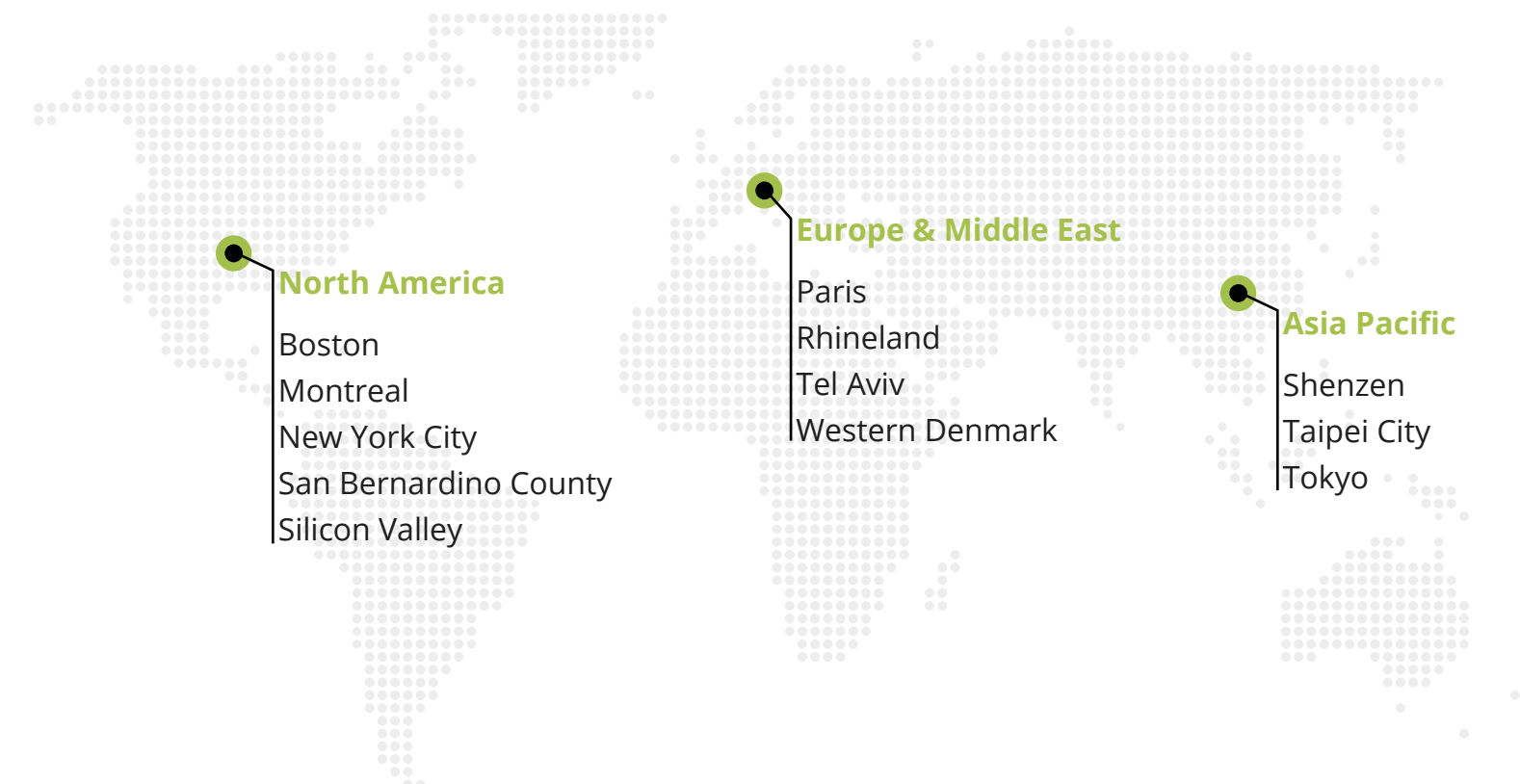
(2018) Global Median: \$3.4 million



Key Startups and Exits

- Nuro (Silicon Valley) raised \$940 million in a Series B round in 2019
- UBTech Robotics (Shenzhen) raised \$820 million in a Series C round in 2018

Ecosystems to Watch



Agtech and New Food

Startup Output

Global Share of Startups **0.8%**

Global Average: 5.2%

Startup Growth **8.3%**

Exits

Exit Value Growth **8.7%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **209.1%**

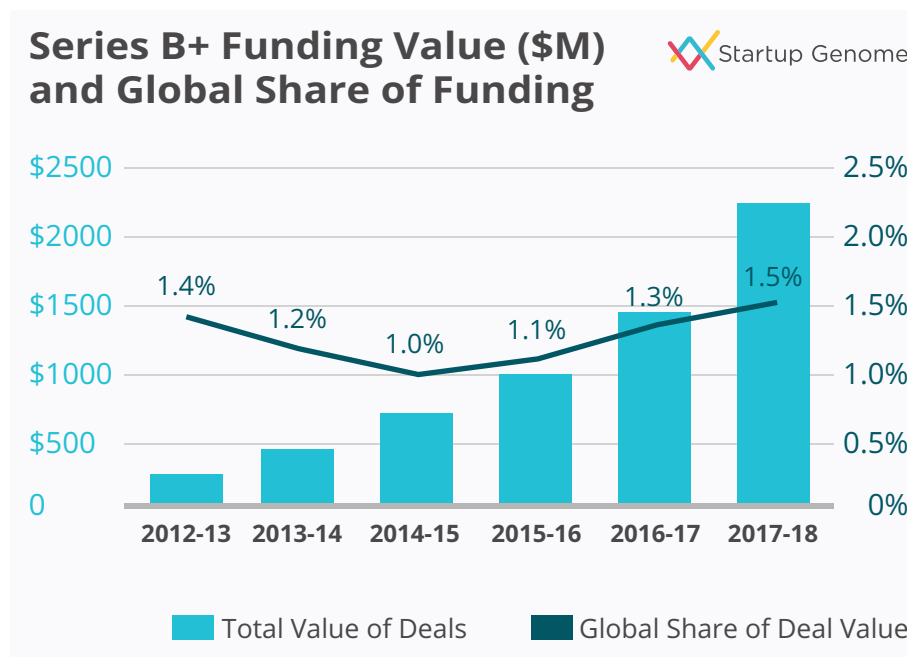
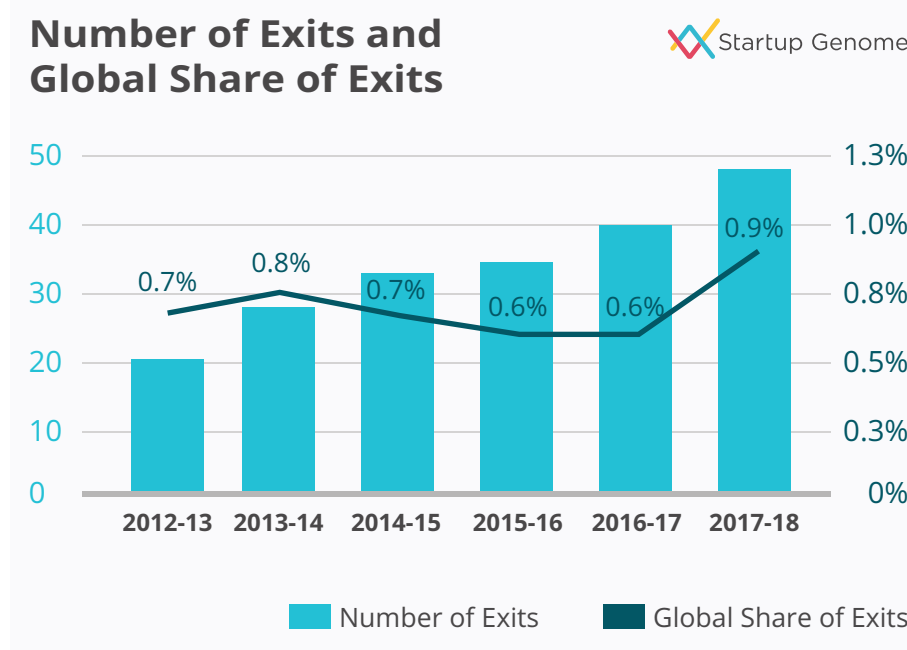
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$500 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$3.2 million**

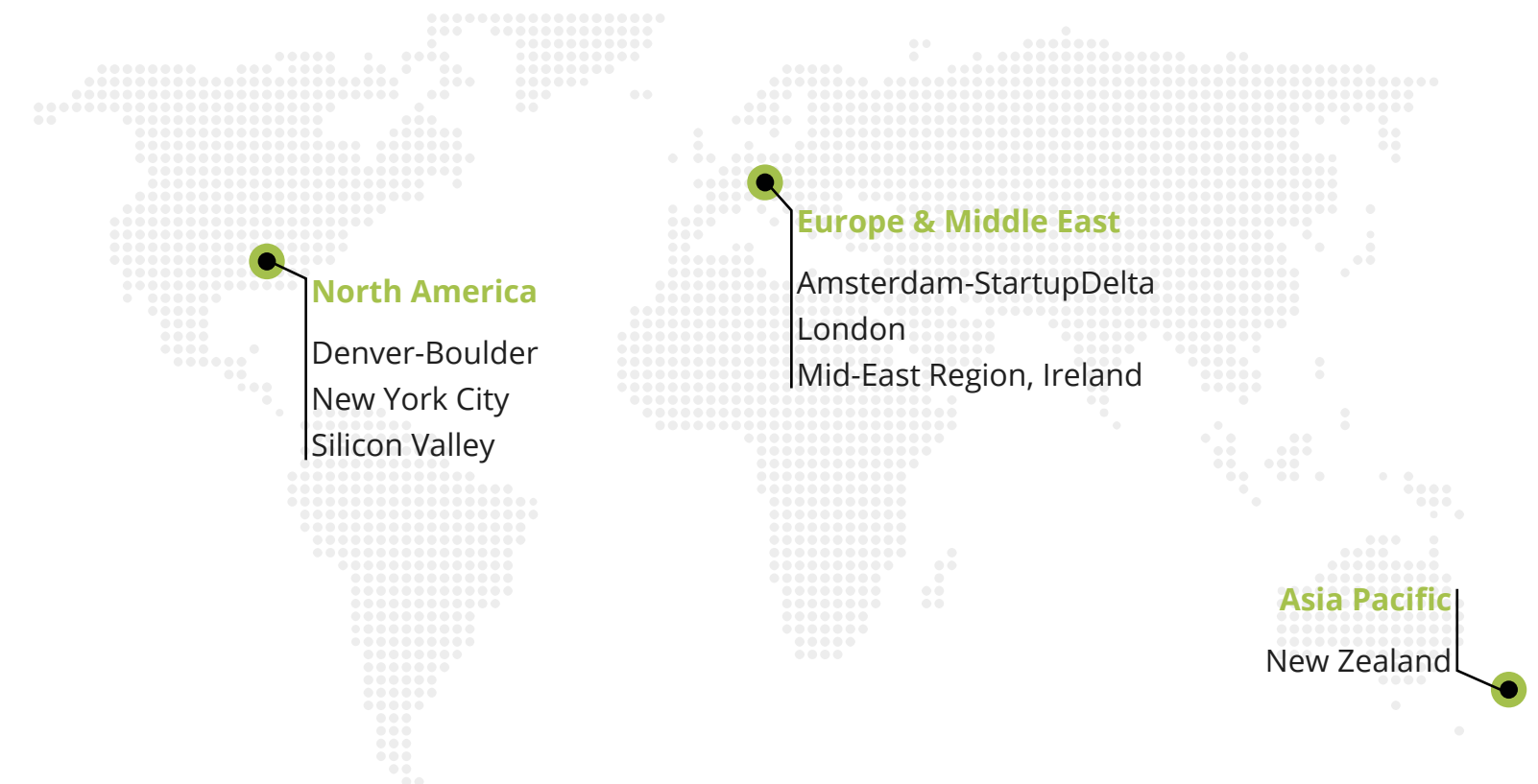
(2018) Global Median: \$3.4 million



Key Startups and Exits

- Indigo (Boston unicorn) raised \$250 million in a Series E round in 2018
- Blue River Technology (Silicon Valley) acquired by John Deere for \$305 million in 2017

Ecosystems to Watch



Cybersecurity

Startup Output

Global Share of Startups **0.9%**

Global Average: 5.2%

Startup Growth **3.6%**

Exits

Exit Value Growth **64.7%**

(2018) Global Average: 90.6%

Funding

Total Funding Value Growth **81.0%**

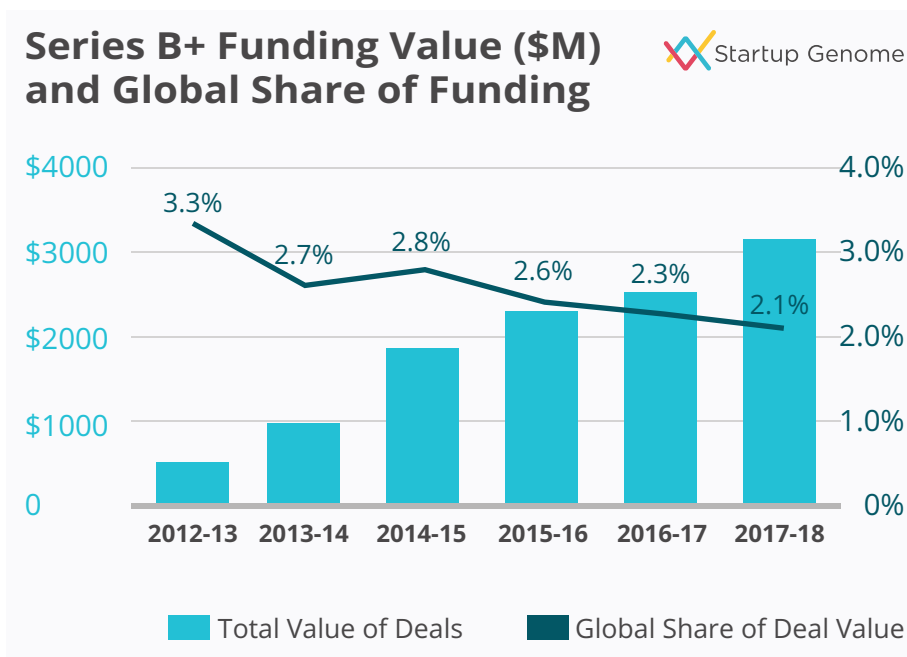
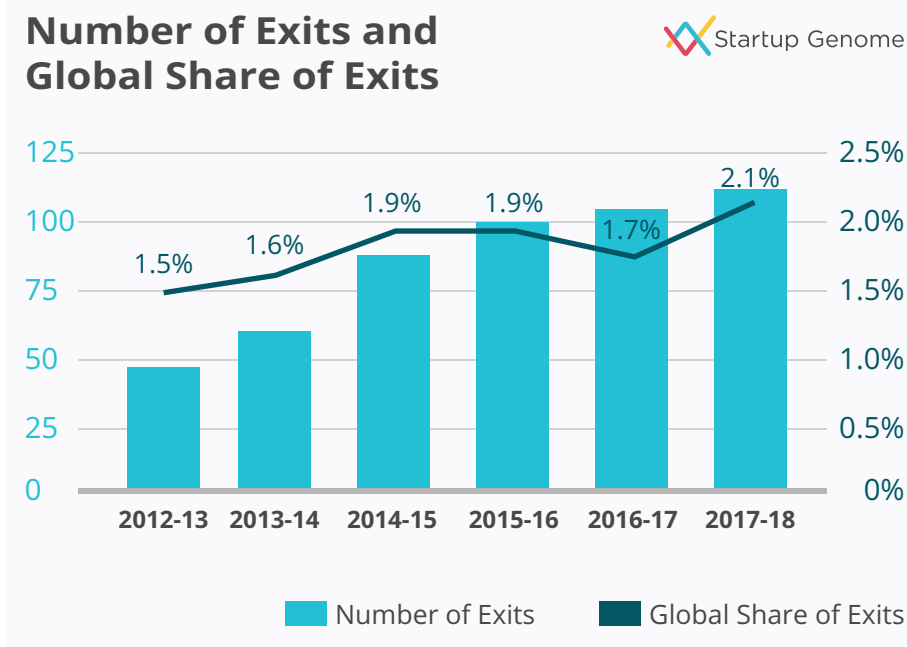
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$750 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$5 million**

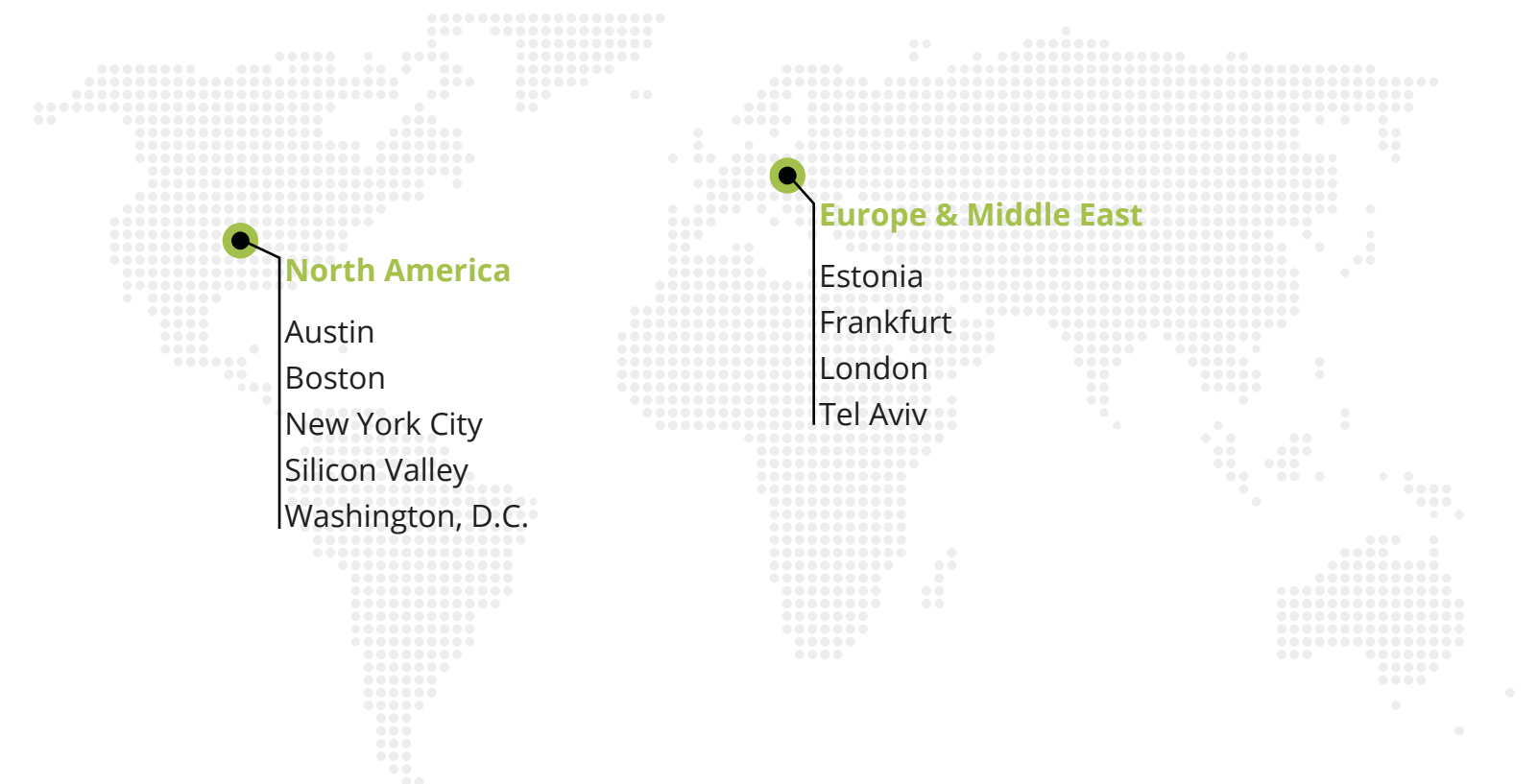
(2018) Global Median: \$3.4 million



Key Startups and Exits

- Sygnia (Tel Aviv) was acquired by Temasek for \$250 million in 2018
- Demisto (Silicon Valley) acquired by Palo Alto Networks for \$560 million in 2019

Ecosystems to Watch



Cleantech

Startup Output

Global Share of Startups **2.9%**

Global Average: 5.2%

Startup Growth **-5.7%**

Exits

Exit Value Growth **41.4%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **132.5%**

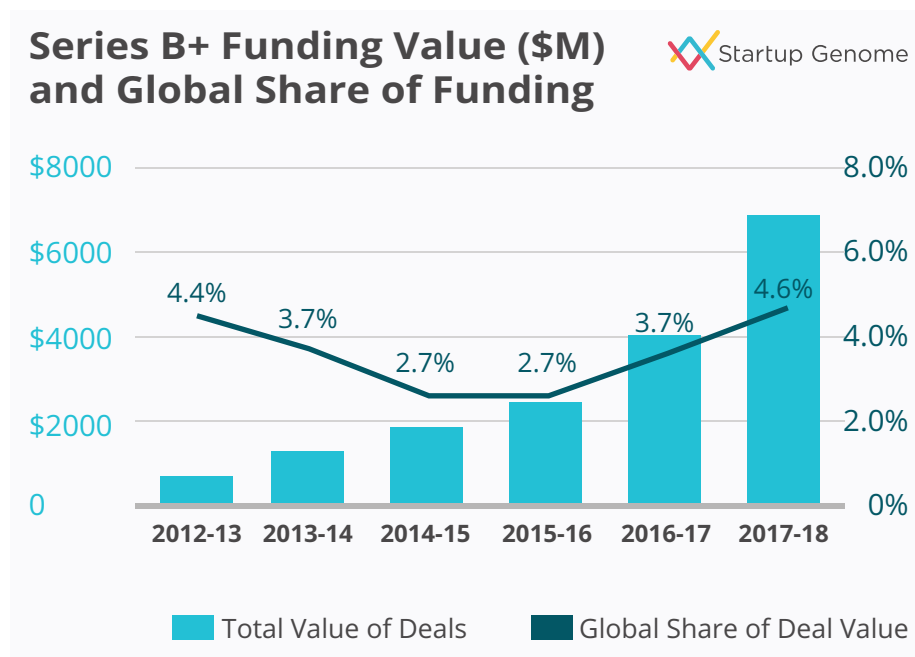
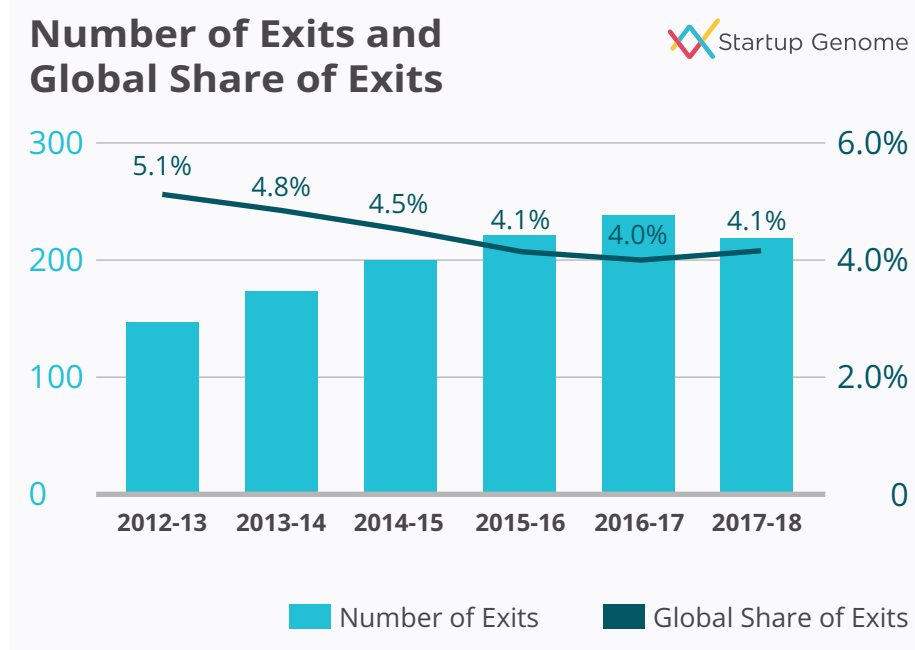
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$500 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$2.9 million**

(2018) Global Median: \$3.4 million



Key Startups and Exits

- ChargePoint (Silicon Valley Unicorn) raised \$240 million in a Series H round in 2018
- Bloom Energy (Silicon Valley) IPO'd in 2018 with a valuation of \$1.6 billion

Ecosystems to Watch



Fintech

Startup Output

Global Share of Startups **8.7%**

Global Average: 5.2%

Startup Growth **1.5%**

Exits

Exit Value Growth **127.7%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **86.0%**

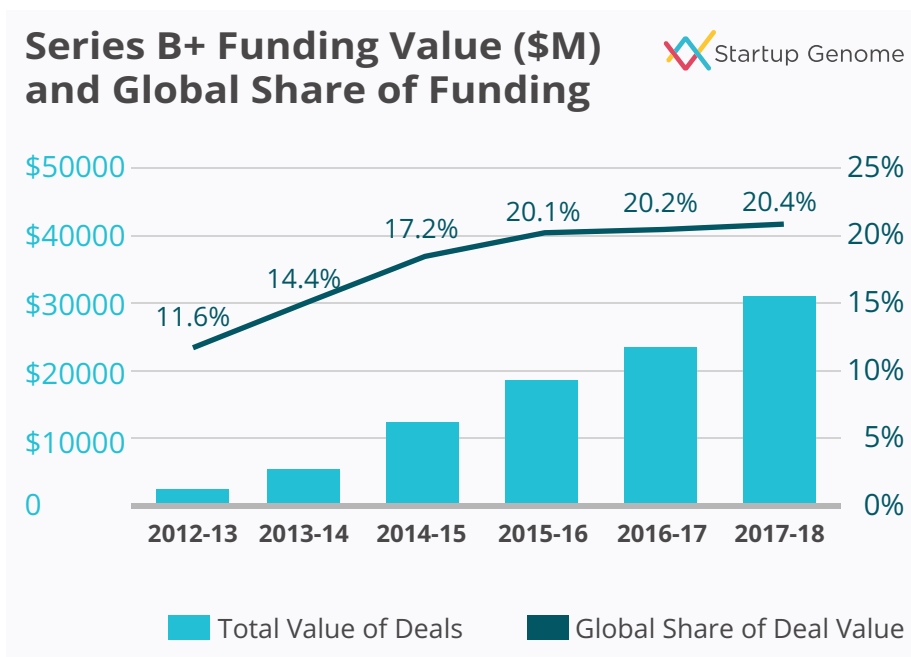
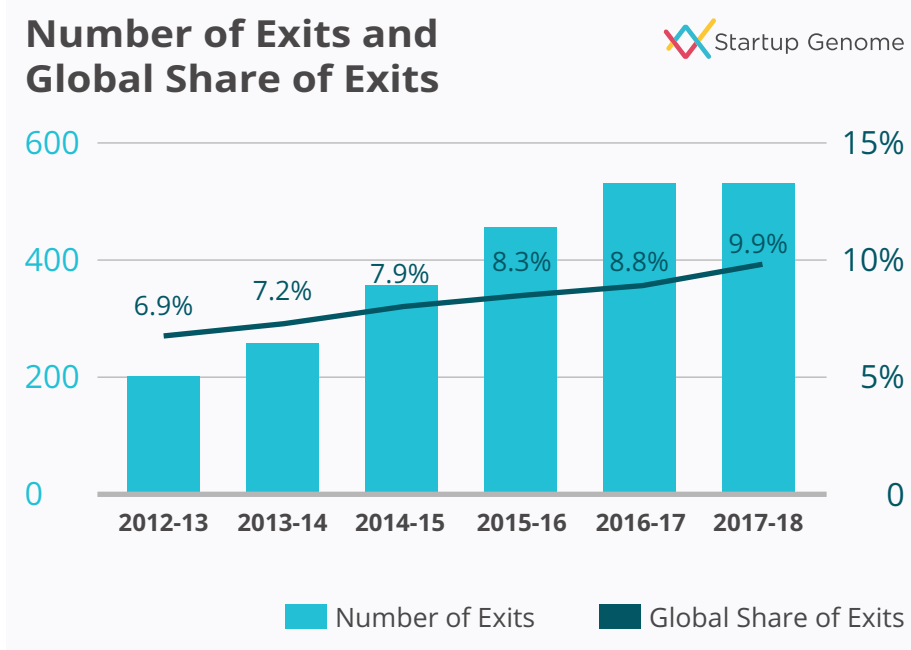
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$600 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$3.6 million**

(2018) Global Median: \$3.4 million



Key Startups and Exits

- TradeShift (Copenhagen Unicorn) raised \$250 million in 2018, giving it a valuation of \$1.1 billion
- OakNorth (London unicorn) raised \$440 million in February 2019

Ecosystems to Watch



Edtech

Startup Output

Global Share of Startups **3.1%**

Global Average: 5.2%

Startup Growth **0.9%**

Exits

Exit Value Growth **118.2%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **73.2%**

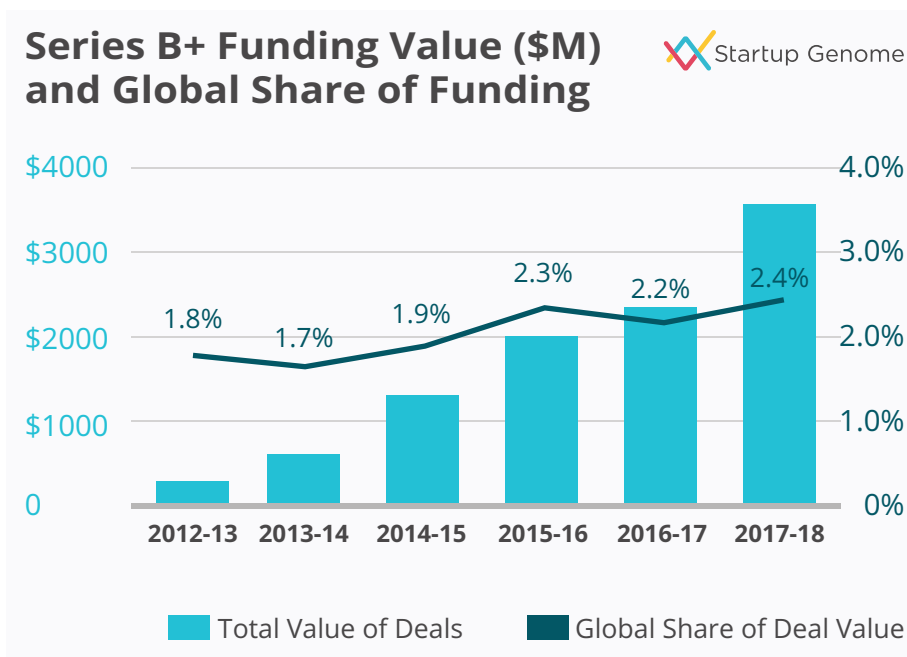
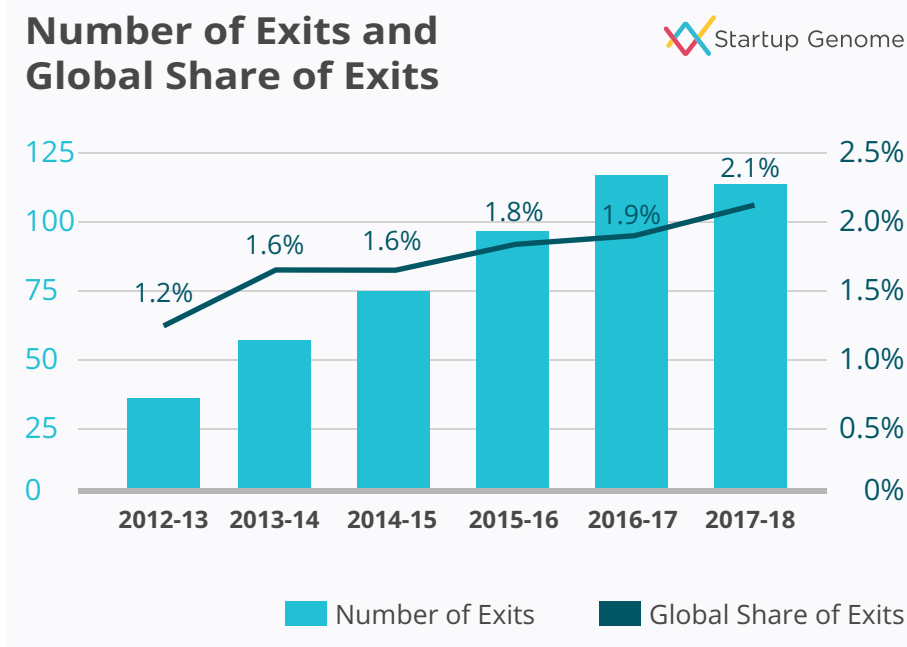
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$583 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$3.6 million**

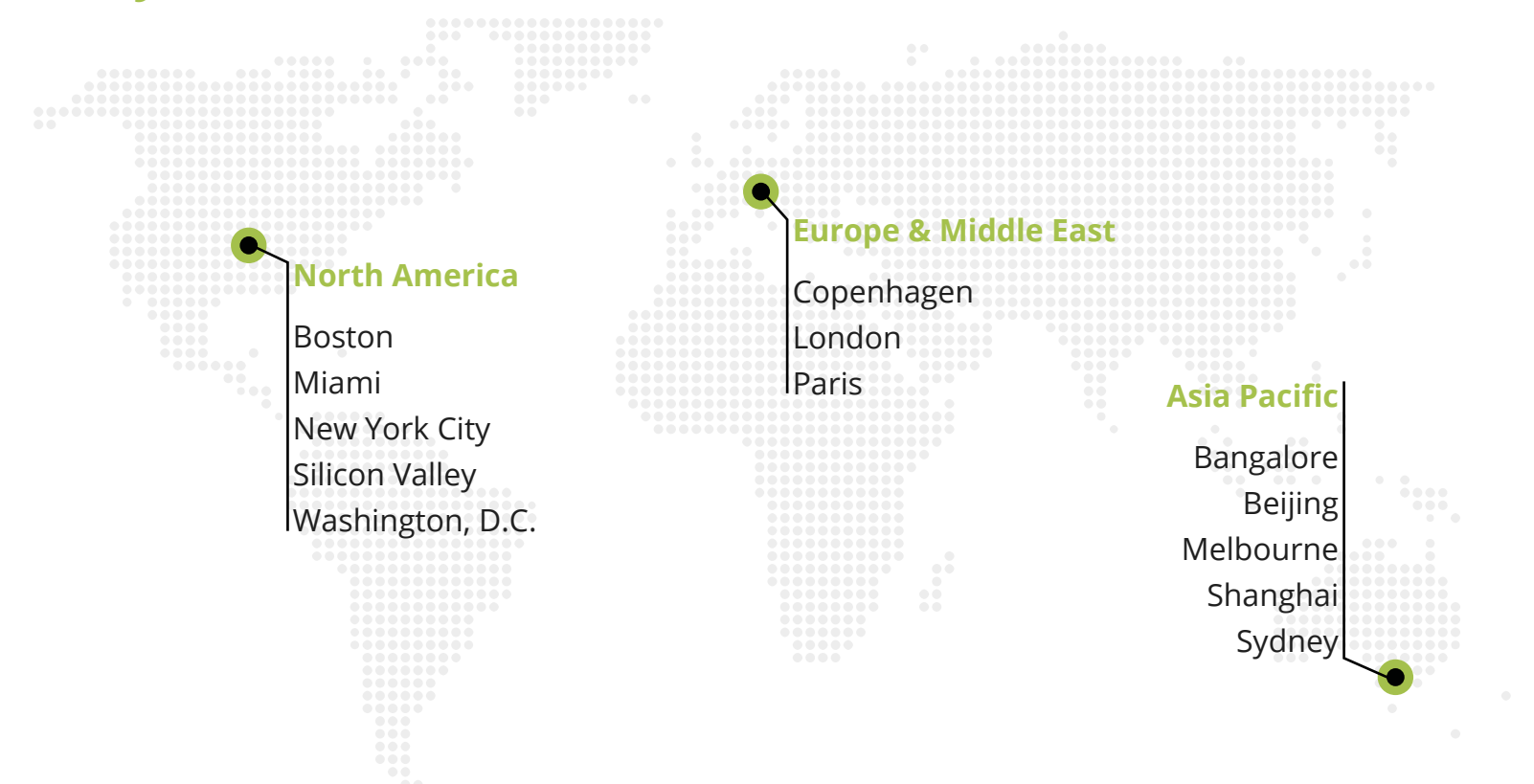
(2018) Global Median: \$3.4 million



Key Startups and Exits

- 17zuoye (Shanghai) became a unicorn in 2018 when it raised \$250 million in Series E funding.
- Byju's (Bangalore) raised \$540 million from Naspers in 2018, valuing the company at \$3.8 billion.

Ecosystems to Watch



Gaming

Startup Output

Global Share of Startups **4.5%**

Global Average: 5.2%

Startup Growth **-12.0%**

Exits

Exit Value Growth **31.4%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **14.4%**

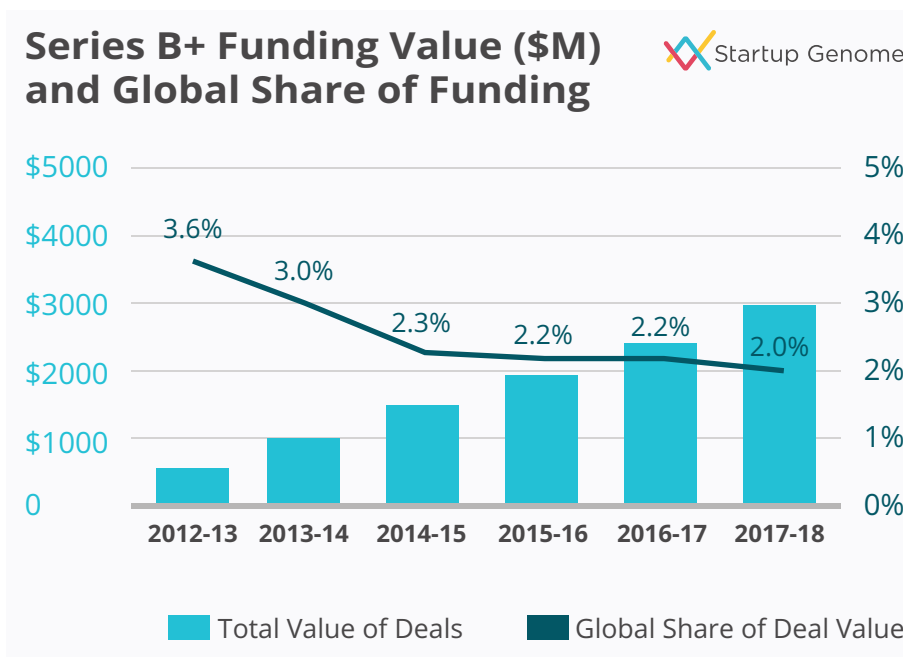
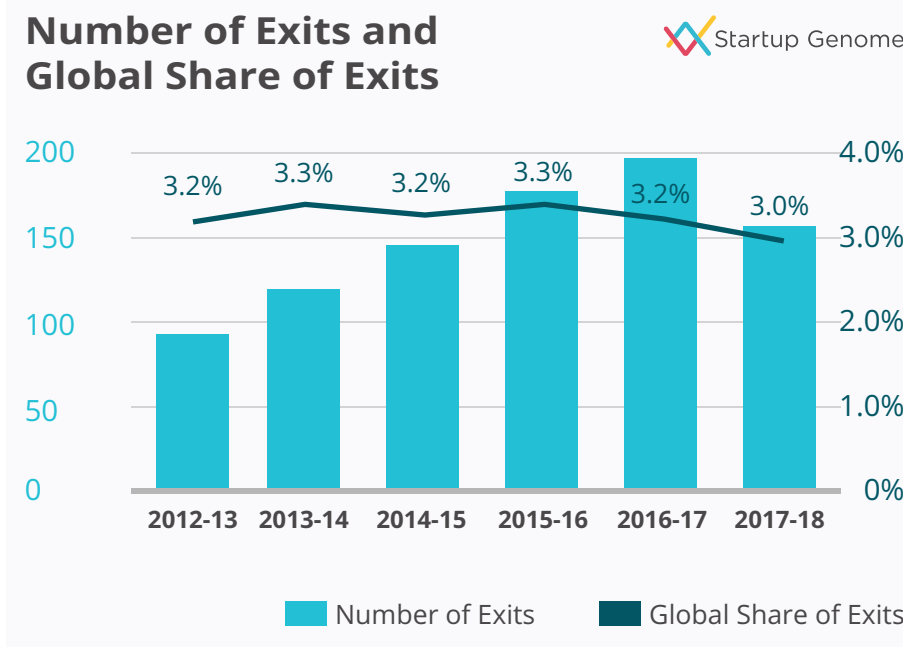
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$611 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$2.6 million**

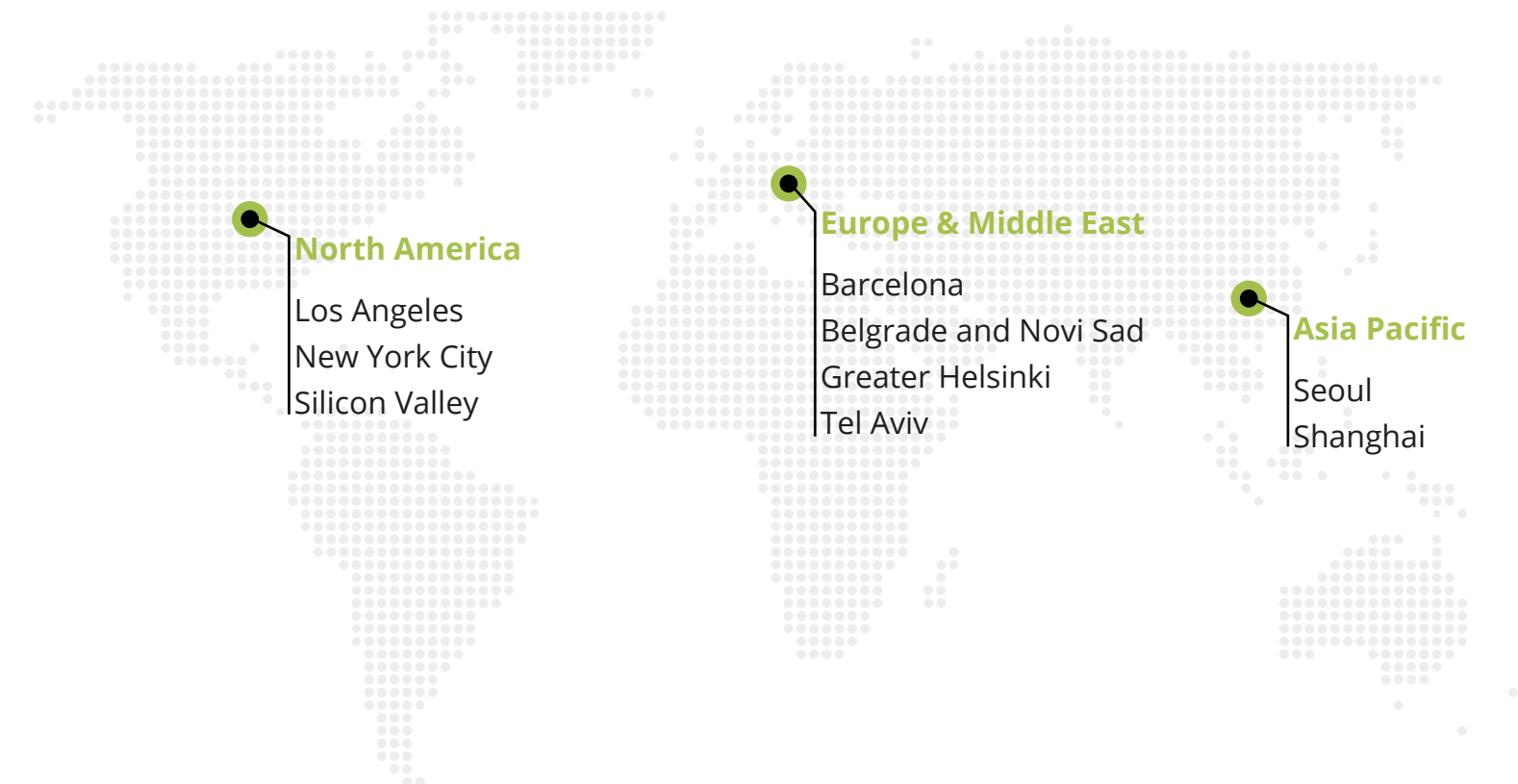
(2018) Global Median: \$3.4 million



Key Startups and Exits

- In 2018, Small Giant Games (Greater Helsinki) was acquired for \$700 million
- Unity Technologies (Silicon Valley Unicorn) raised \$145 million in a Series D round in 2018

Ecosystems to Watch



Adtech

Startup Output

Global Share of Startups **4.2%**

Global Average: 5.2%

Startup Growth **-9.8%**

Exits

Exit Value Growth **46.8%**

(2013-14 to 2017-18) Global Average: 90.6%

Funding

Total Funding Value Growth **-1.9%**

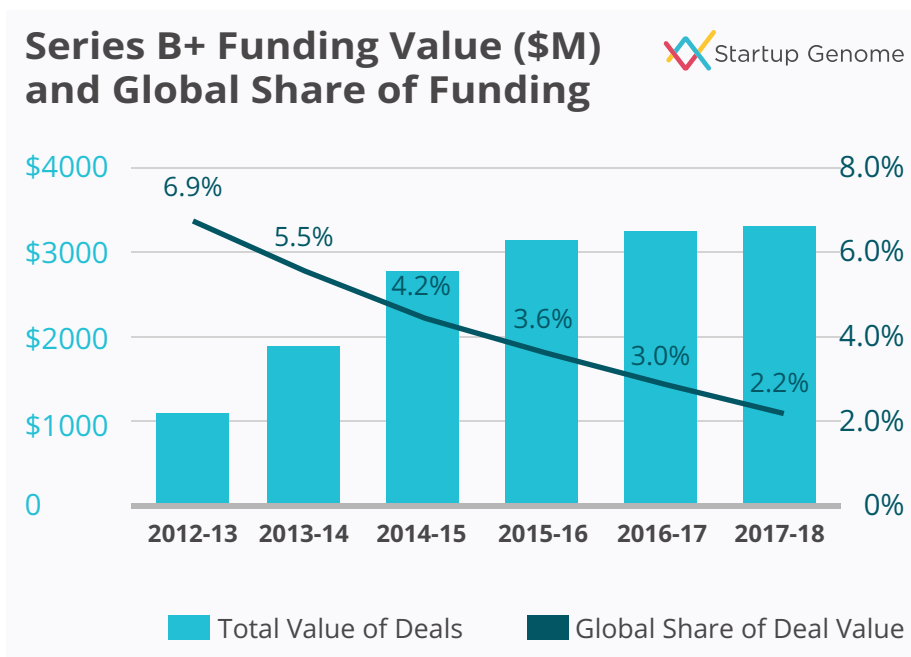
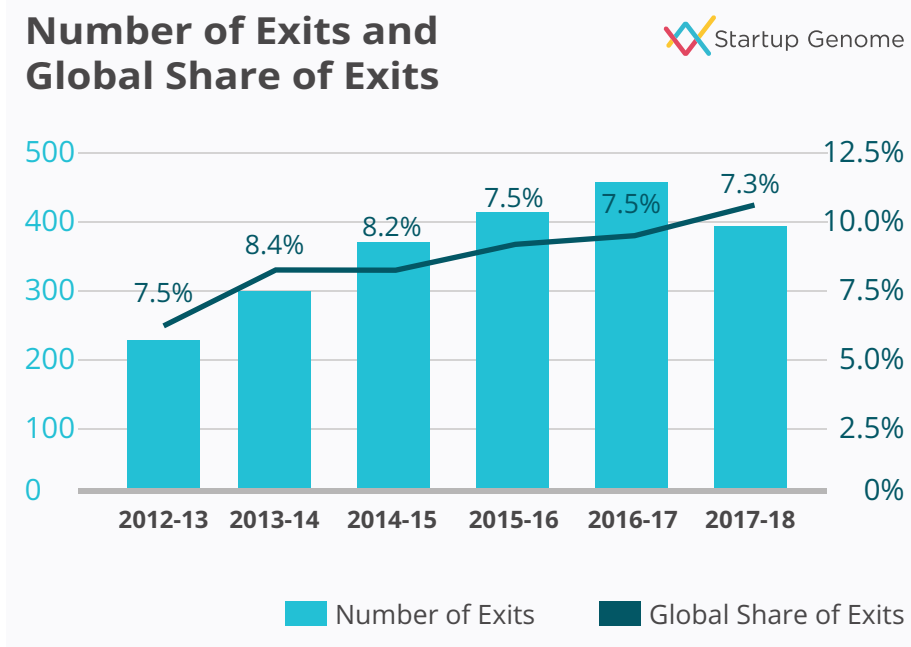
(2013-14 to 2017-18) Global Growth: 101%

Median Seed Deal Value **\$500 k**

(2018) Global Median: \$500 k

Median Series A Deal Value **\$3 million**

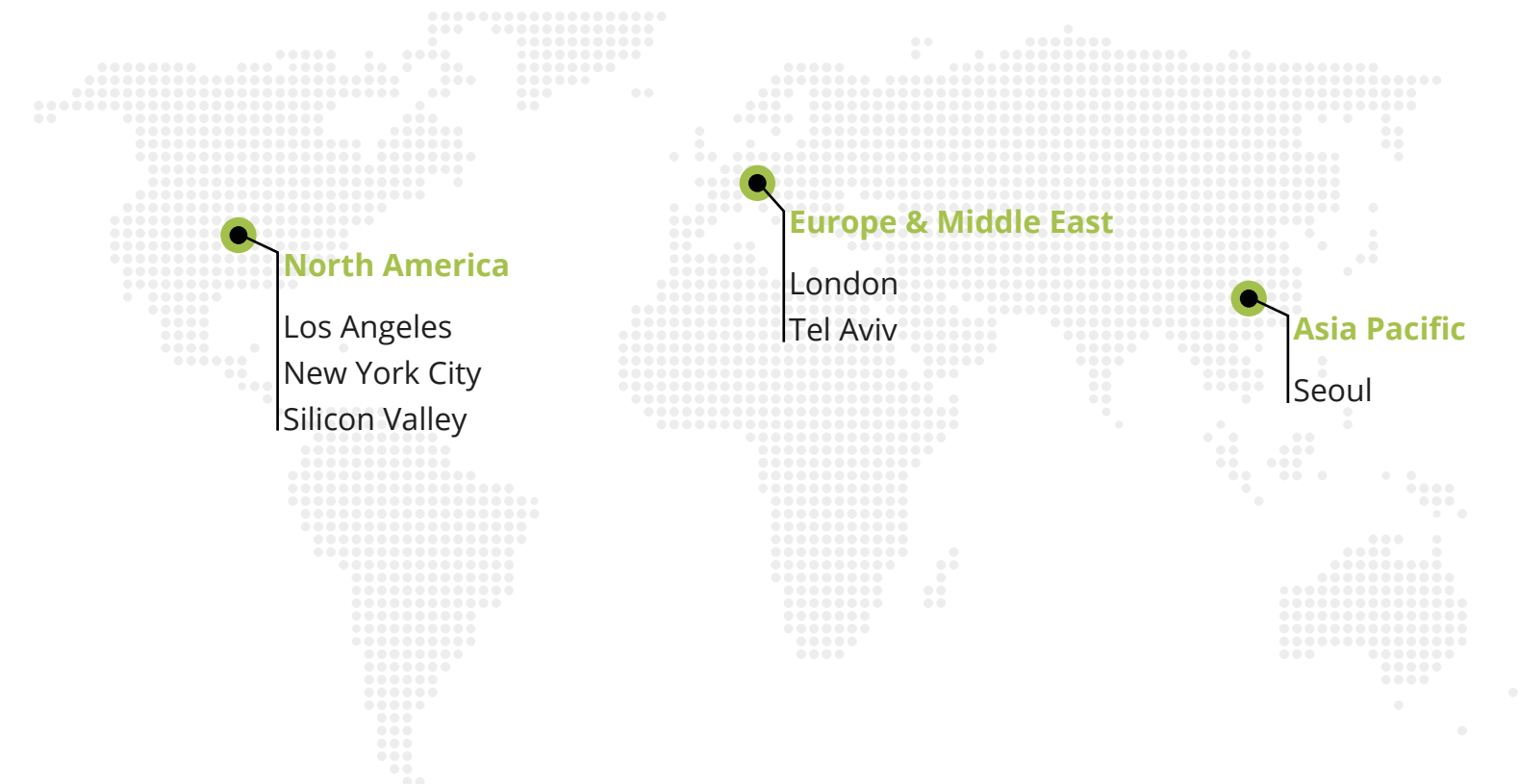
(2018) Global Median: \$3.4 million



Key Startups and Exits

- Moat (New York) acquired by Oracle for \$850 million in 2017
- AppLovin (Silicon Valley) raised \$400 million in 2018 giving it a valuation of \$2 billion

Ecosystems to Watch





Ecosystem **Deep Dives** by Lifecycle

Understanding Your Startup Ecosystem Lifecycle

With the rapid growth of the global startup revolution, more and more regional and national governments are investing to try to accelerate the growth of their startup ecosystem. Startup Genome has developed the science of startup ecosystems and use it to advise more than 40 governments to increase startup success.

How can policymakers prioritize to achieve maximum impact on a startup ecosystem, the most complex type of industry cluster? Over the years, extensive research and data from our global surveys with almost 100,000 founders (to date) across more than 30 countries have given us the data needed to comprehend this complex system. The Ecosystem Lifecycle Model is an objective model that helps governments measure where their ecosystem is at, prioritize its gaps, and define focused action plans that maximize impact rather than disperse their limited resources. We call it focusing policy and program resources on the right issues at the right time.

Lifecycle Phases

Startup ecosystems develop through four phases, each with a different set of characteristics, challenges, and objectives.

In general, Startup Experience (which includes scaleup experience) increases and drive 1) the growth of the ecosystem's Startup Output (number of startups) and 2) its resources, and only after it achieves the larger size characteristics of Globalization Phase ecosystems, a predictable and increasing performance at creating scaleups and economic impact.

1. Activation Phase

a. Characteristics:

- i. Limited Startup Experience (founder know-how, experienced investors, advisors and mentors, and community behaviors that support startup success)

- ii. Low Startup Output of around 1,000 or fewer startups
- iii. Challenges: lack of Startup Experience and resource leakages to later-stage ecosystems make it difficult to grow

b. Objective: Focus on increasing the Startup Output and Early-Stage Funding. Activate entrepreneurial-minded people and grow a more connected local community that helps each other. Pick one or two startup subsectors (e.g. AgTech) that build on local economic strengths and develop focused programs to accelerate ecosystem growth and develop pockets of success leading to sizeable exits.

2. Globalization Phase

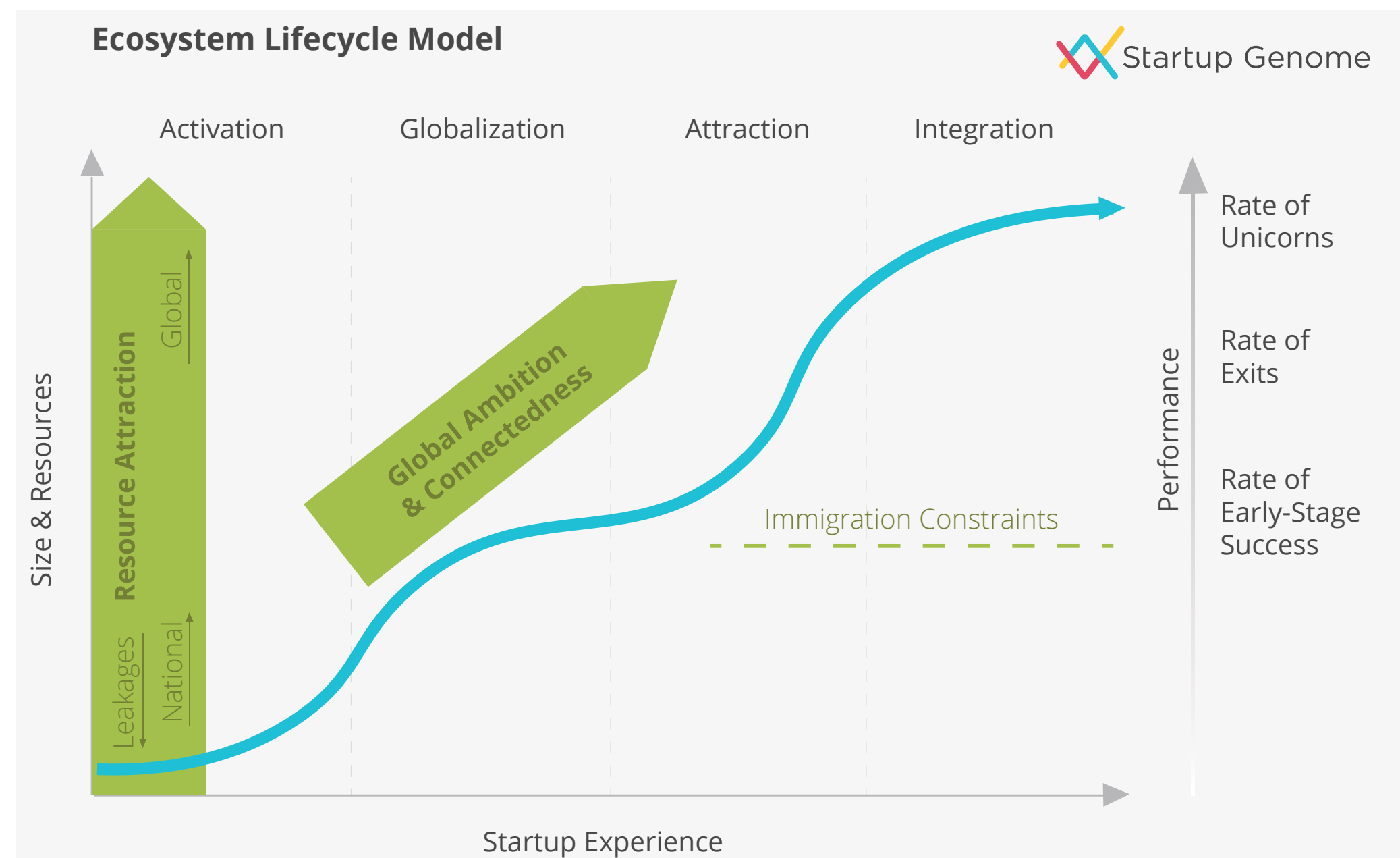
a. Characteristics:

- i. Trigger to this Phase: increased Startup Experience led to the production of a series of regionally impressive “Triggers”, usually above \$100 million (higher in leading nations)
- ii. Output of 800 to 1,200 startups (depending on population)
- iii. Series of exits Trigger National (or Regional) Resource Attraction (startups, entrepreneurs, talent, investors) from earlier-Phase ecosys-

tems, but still leaks resources to top ecosystems globally

b. Objective: Focus on increasing Global Connectedness with founders of top ecosystems, the Success Factor that defines an ecosystem’s scaleup potential, and supporting startups to increase their

early Global Market Reach, which realizes an ecosystem’s scaleup potential. Urgently address remaining Success Factors gaps.



3. Attraction Phase

a. Characteristics:

- i. Usually more than 2,000 startups (depending on population)
- ii. Trigger to this Phase: a series of globally impressive “Triggers”, usually unicorns and exits above \$1 billion (higher in leading nations)
- iii. Billion-dollar Triggers produce Global Resource Attraction
- iv. Very few Success Factor gaps remain

b. Objective: use Global Resource Attraction to significantly expand the size of the ecosystem and fill remaining gaps, removing barriers to immigration and directing attraction through well-designed policies programs.

produce leading-edge business models and the skills necessary to achieve high Global Market Reach

b. Objective: Integrate the ecosystem within the global, national, and local flows of resources and knowledge inside and outside of the startup ecosystem, optimizing laws and policies to sustain its competitiveness and growth, and spreading its benefits (e.g. culture, source of competitiveness, capital, innovation) to other sectors of the economy and parts of the nation.

4. Integration Phase

a. Characteristics:

- i. More than 3,000 startups
- ii. Global Resource Attraction produce a high and self-sustainable degree of Global Connectedness and flow of knowledge into the ecosystem that sustainably keep its startups integrated in the global fabric of knowledge and able to

Ecosystem Deep Dive Key Metrics

Software Startup Output

Number of software startups in the ecosystem, calculated using MSE (Multiple System Estimation) method

Ecosystem Value

A measure of economic impact, calculated as the value of exits and startup valuations over 2016, 2017, and the first half of 2018

Exit Growth Index

Index of growth in tech startup exits in the ecosystem from 2015-2016 to 2017-2018. Measured on a scale of 1-10, where 10 is the highest tier of growth observed and 1 is the lowest

Funding Growth Index

Index of growth in early-stage funding (Seed and Series A) in tech startups in the ecosystem from 2014-2015 to 2016-2017. Measured on a scale of 1-10, where 10 is the highest tier of growth observed and 1 is the lowest

Output Growth Index

Index of growth in total startup creation in the ecosystem, calculated in an annualized growth rate from 2014 to 2018. Measured on a scale of 1-10, where 10 is the highest tier of growth observed and 1 is the lowest

Total Early Stage Funding

Total Seed and Series A funding in tech startups in 2016, 2017 and first half of 2018

Early Stage Funding Per Startup

Average early-stage funding per startup in the ecosystem

Software Engineer Salary

Average software engineer salary (lower is better): from Glassdoor, Salary.com, and PayScale; as well as local sources when applicable

Ecosystem Badges

Badges are used to highlight key strengths ecosystems have that can be leveraged by startups, investors, and other ecosystem builders.

Startup Sub-Sector Badges

Based on the global or phase ranking in specific sub-sectors such as AI, Life Sciences, Blockchain, and Fintech. These rankings are based on sub-sector-specific factors of Performance, Funding, Talent, Legacy Industry Strengths, Experience, Knowledge, and Focus.

Bang for Buck Badge

How far does your money go as a startup in this ecosystem? As the name suggests, this badge means getting more value for the average funding amount startups to get in the ecosystem. Specifically, we measure this as the ratio of the average Early-Stage Funding per Startup by the average Software Engineer Salary in the ecosystem. This approximately translates to, with the

average funding a startup gets in this ecosystem, how many software engineers can you hire for one year? The higher the multiple, the better for the ecosystem.

Affordable Talent Badge

Showcases affordable ecosystems based on talent costs, calculated based on average software engineer salaries.

Ranking Success Factor Badges

Showcases ecosystem strengths in Ecosystem Success Factors. For more details on these see the Overall Rankings and the Methodology sections of the report.

Ecosystem Lifecycle Trends

1. High-Growth Ecosystems

Europe leads in the number of top growing ecosystems across phases. Interestingly, all the high growth ecosystems are outside of the U.S.

PHASE	RANK	ECOSYSTEM
Activation	1	Western Denmark
	2	Belgrade and Novi Sad
	3	Taipei City
	4	Atlantic Canada
	5	Manila
Globalization	1	Paris
	2	Montreal
	3	Antwerp
	4	Sydney
	5	Copenhagen
Attraction	1	Amsterdam-StartupDelta
	2	Bangalore
	3	Stockholm

Fastest-Growing Ecosystems by Phase*

*Based on growth in funding, exits & number of startups.

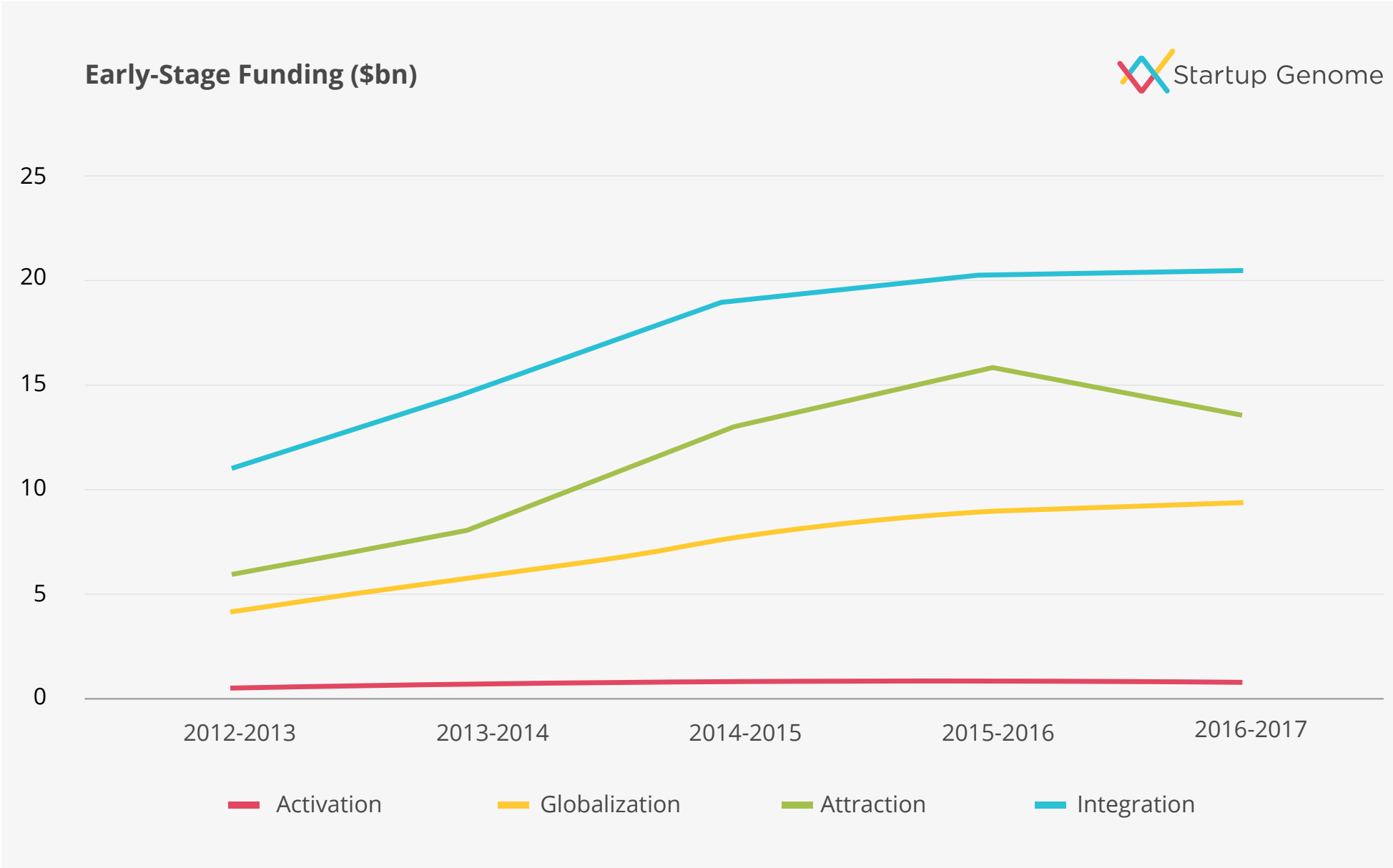


2. Early-Stage Startup Funding Across Phases

Early-Stage Funding

Globalization and Attraction phase ecosystems lead growth in early-stage funding experiencing more than 20% annual growth from 2012-13 to 2016-17.

Ecosystem Phase	Annual Growth Rate (2012-2013 to 2016-2017)
Activation	15.2%
Globalization	23.1%
Expansion	23.7%
Integration	17.9%

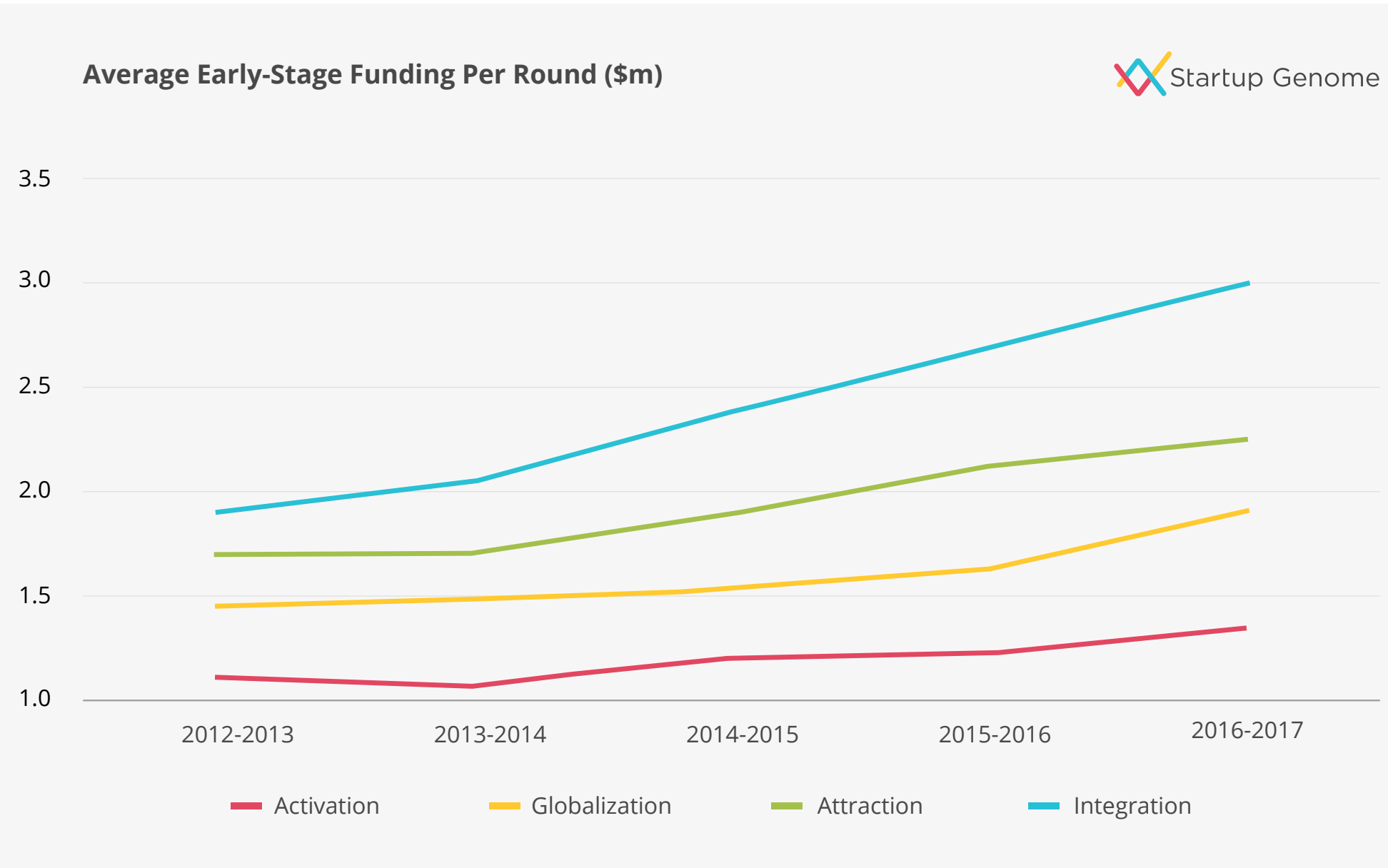


Average Funding Round

Average early-stage funding is growing faster in larger ecosystems with average early-stage funding in Integration phase ecosystems growing at a rate twice that of the Activation phase ecosystems.

Note: Data for 2017-2018 has not been displayed as the capture of seed funding rounds by public databases is subject to a 2-3 year lag and therefore, is not accurate.

Ecosystem Phase	Annual Growth Rate (2012-2013 to 2016-2017)
Activation	5.0%
Globalization	7.5%
Expansion	7.4%
Integration	12.1%

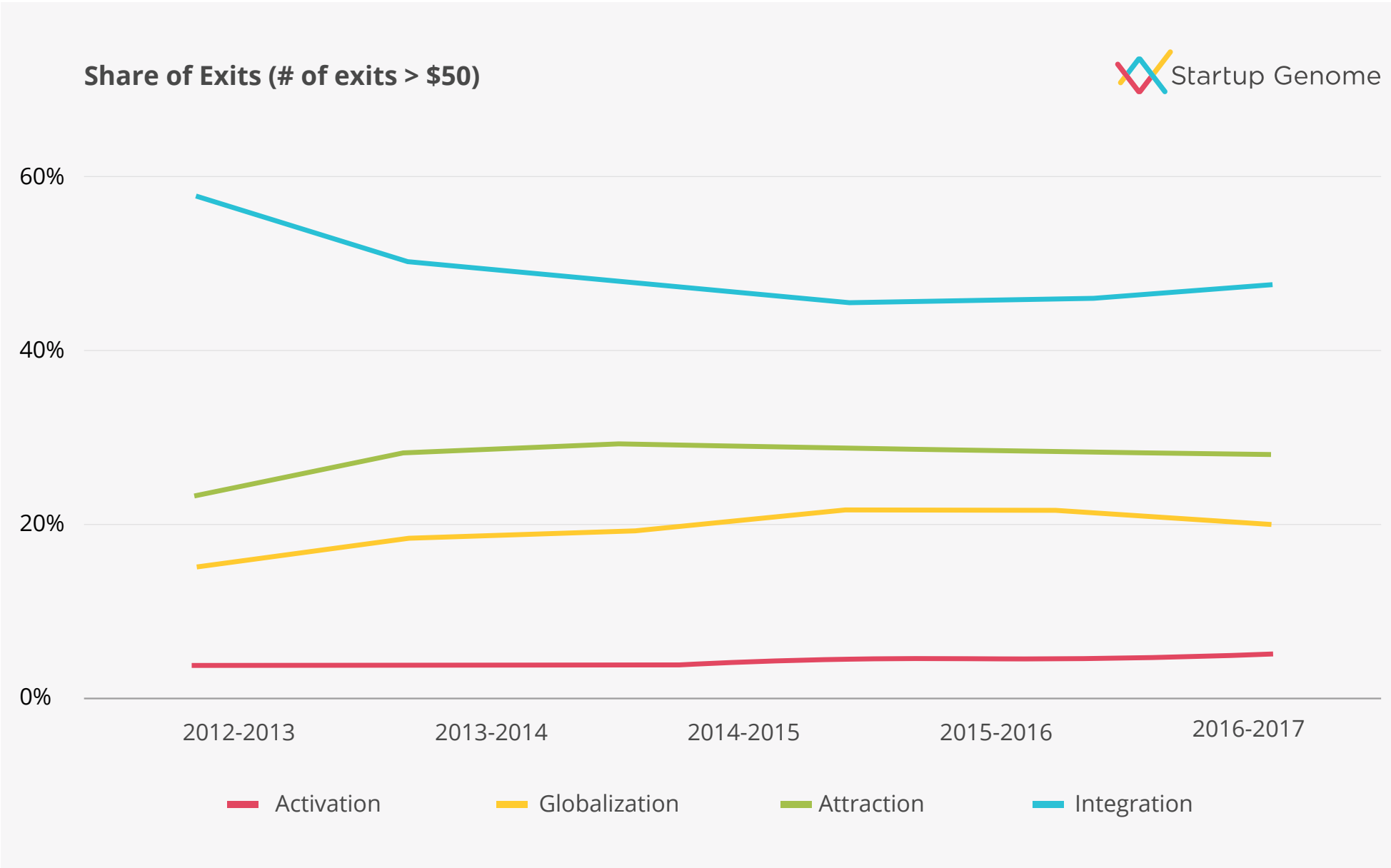


3. Startup Exits Across Phases

Share of Exits

Activation, Globalization, and Attraction phase ecosystems have gained ground over the years and reduced total share of startup exits for Integration phase ecosystems from 58.0% in 2012-13 to 47.6% in 2017-18.

Ecosystem Phase	Share of exits (\$50m+)	
	2012-2013	2017-2018
Activation	3.9%	4.5%
Globalization	14.9%	19.7%
Expansion	23.2%	28.2%
Integration	58.0%	47.6%



Share of Large Exits (\$100 million+)

Non-Integration phase ecosystems are catching up in terms of share of large exits and reducing the gap.

Ecosystem Phase	Share of Large Exits (\$100 million+)	
	2012-2013	2017-2018
Activation	1.9%	5.5%
Globalization	5.1%	6.8%
Expansion	6.5%	8.5%
Integration	10.8%	11.5%



Ecosystem Deep Dives

Activation Phase

93	Atlantic Canada, CA	99	Estonia, EE	105	Nur-Sultan, KZ
94	Bahrain, BH	100	Frankfurt, DE	106	Québec City, CA
95	Belgrade and Novi Sad, RS	101	Lithuania, LT	107	San Bernardino, US
96	Busan, KR	102	Manila, PH	108	Taipei City, TW
97	Calgary, CA	103	Mid-East Region, IE	109	Western Denmark, DK
98	Edmonton, CA	104	New Zealand, NZ		

Activation Phase Ecosystems

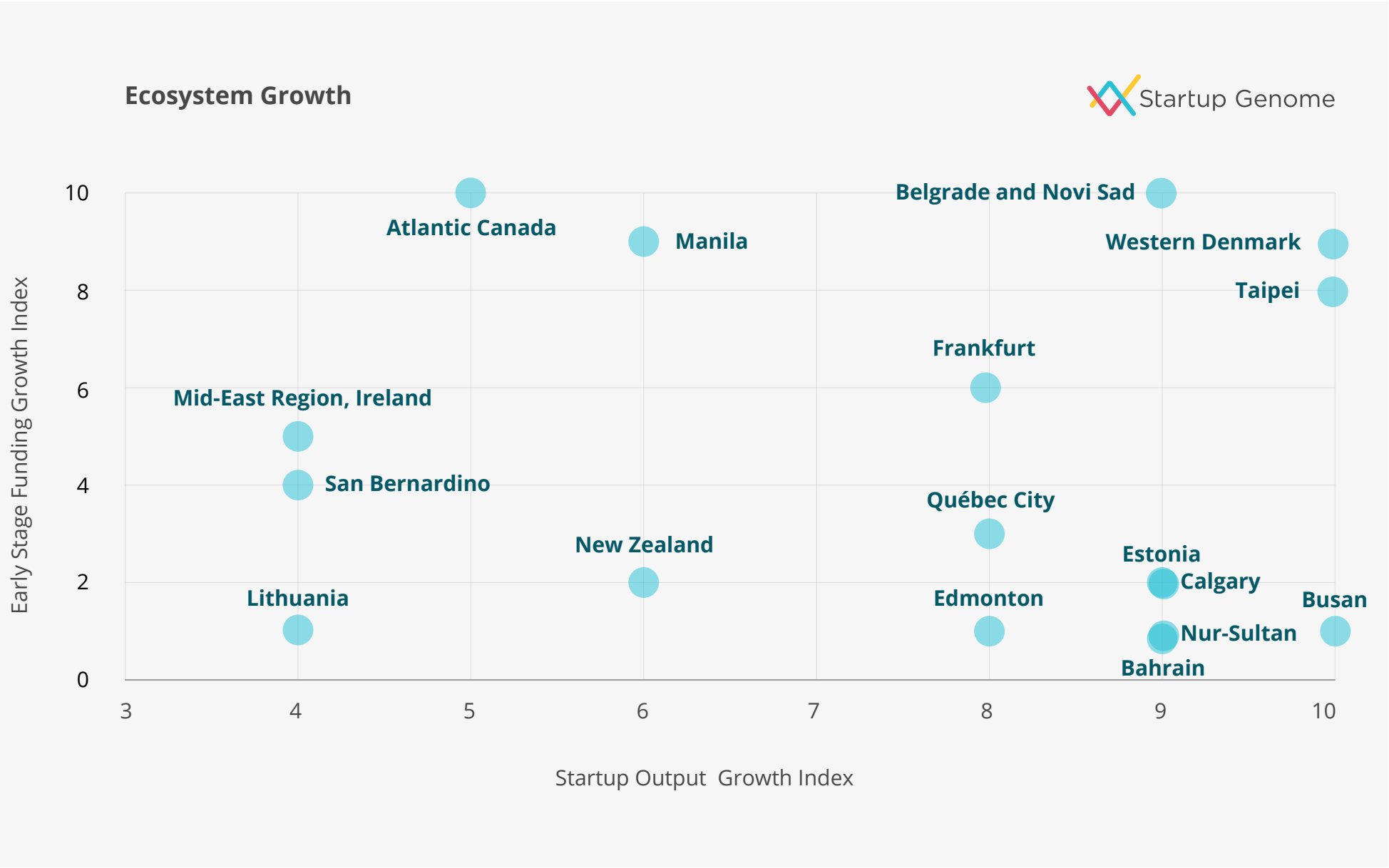
Key Objective for Activation Phase Ecosystems

1. Local Connectedness: Top 5 Ecosystems

- Taipei City
- Busan
- Calgary
- Manila
- Frankfurt

2. Early-Stage Funding per Startup: Top 5 Ecosystems

Ecosystem	Early Stage Funding per Startup (\$)
Atlantic Canada	\$383 k
Frankfurt	\$312 k
New Zealand	\$279 k
Belgrade and Novi Sad	\$222 k
Taipei City	\$206 k



Atlantic Canada

Ecosystem Phase: **Activation**



Sub-Sector Strength: **Life Sciences**

Atlantic Canada offers a robust Life Sciences ecosystem, from Halifax’s Life Sciences Research Institute, an integrated facility for scientists, students, and entrepreneurs, to Charlottetown’s \$30 million BioCommons. According to Financial Times’ fDi Benchmark, Halifax is the third most cost-effective location for operating a Life Sciences research center in Canada and the USA. It’s produced such landmark deals as Ocean Nutrition Canada’s \$540 million exit and ABK Bioscience’s US\$30 million Series B round in 2019.



Sub-Sector Strength: **Marine Tech**

Atlantic Canada is home to Canada’s Ocean Supercluster, which will feature more than \$300 million in R&D spending from the private and public sectors. The region includes the Centre for Ocean Ventures and Entrepreneurship, a collaborative space for ocean-related innovation, and the Ocean Frontier Institute, which leverages Dalhousie University’s ocean research activities.

Startup Genome Member(s): Innovacorp

“Exits by Atlantic Canada startups have generated over \$2 billion since 2012. These exciting entrepreneurs have been investing back into the ecosystem through new startups, incubators, accelerators, and investment funds.”

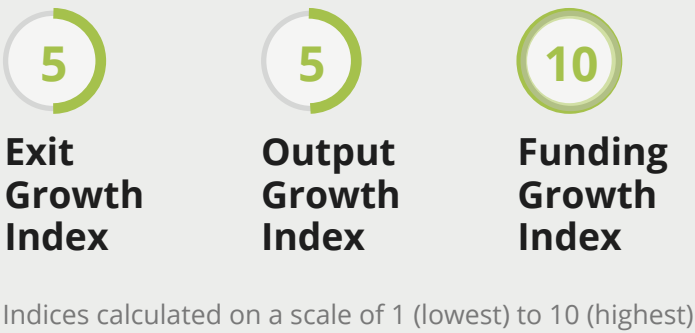
Malcolm Fraser
President and CEO of Innovacorp

Why you should invest in Atlantic Canada

Top 15 Global Ecosystem
Bang for Buck

Software Startup Output **<100**
Global Avg: 1,010

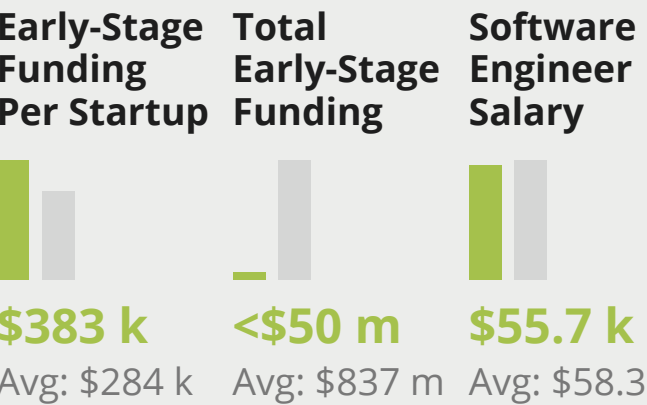
Ecosystem Value **\$250 m**
Global Median: \$5 bn



Reasons to move your startup to Atlantic Canada

Innovation Tax Credits: Investors can apply for the innovation equity tax credit on investments of up to \$250,000. Companies may receive a tax credit of 45 percent for investment in oceans technology and life sciences

Immigration Policy: Atlantic Canada is known for welcoming newcomers with its supportive immigration policies, such as the Atlantic Immigration Pilot, which help attract foreign talent.



Bahrain

Ecosystem Phase: **Activation**

Bahrain is online. The country ranks #1 globally in mobile broadband penetration (162.1 per 100 population) and #2 globally for the percentage of internet users (98%). Recently, the Bahrain Development Bank announced that the Al Waha Fund of Funds successfully closed a \$100 million fundraising round to invest in regional startups, making it the first active venture capital fund of funds in the region.

Sub-Sector Strength: **Fintech**

Bahrain ranks first globally in Islamic finance regulation in the Global Islamic Finance Report due to its standards on crowdfunding and open banking. The Bahrain government has reduced capital startup requirements from \$50,000 to \$100 for some businesses and introduced a regulation-exempt “sandbox” for Fintech startups. Bahrain’s private sector will soon launch a new \$100 million fund dedicated to the Fintech sector. In 2018, Waqfe raised \$2 million from investors.

Startup Genome Member(s): Tamkeen

“One of Bahrain’s key competitive advantages in the region is its educated, economically active young population. We have redoubled our efforts to support globally recognized training solutions to broaden and deepen our pool of tech-savvy professionals.”

Dr. Ebrahim Mohammed Janahi
CEO at Tamkeen

Why you should invest in Bahrain

 Top 15 Global Ecosystem
Affordable Talent

Software Startup Output **100-200**
Global Avg: 1,010

Ecosystem Value **\$594 m**
Global Median: \$5 bn

5

Exit Growth Index

9

Output Growth Index

1

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Bahrain

Wage subsidy: Registered companies may get support for their local employees — up to 18 months for fresh graduates (up to \$1,300 per month). The program also offers wage increment support for up to two years.

Liberal tax regime: Bahrain offers 0% corporate and personal tax, making it the most liberal tax regime in the Gulf.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
 \$159 k Avg: \$284 k	 <\$50 m Avg: \$837 m	 \$32.4 k Avg: \$58.3 k

Belgrade and Novi Sad Serbia

Ecosystem Phase: **Activation**

The Serbian government has invested around \$79 million in technical infrastructure to nurture startups, including initiatives like free workspaces and a focus on tech in universities.



Sub-Sector Strength: **Blockchain**

Serbia is one of the top five countries in the world in the number of blockchain developers, and has many product-oriented blockchain startups. The biggest ICOs in Serbia include those by GameCredits (\$56 million) and OriginTrail (\$22 million). Other local stars are Blinking, blockchain-based digital ID solution giving users control over their data, and MVP Workshop, named the 2018 EY Innovative Entrepreneur of the Year.



Sub-Sector Strength: **Gaming**

Nordeus is a self-funded Belgrade-based game developer that created a popular football app with 180 million users, generating more than \$75million in revenue in 2016. 3Lateral, a leading developer of digital animation and creative content, was acquired by Epic Games in 2019 for an undisclosed amount. Serbian Games Association organizes various programs and incubators in partnership with big names, such as Facebook and Unity.

Startup Genome Member(s): Digital Serbia Initiative

"Serbia has a promising startup ecosystem where the most successful startups are bootstrapped, but we are now seeing active involvement of both private and public sector focusing on further acceleration including early-stage funding."

Nebojsa Djurdjevic

CEO at Digital Serbia Initiative

Why you should invest in Belgrade and Novi Sad



Top 5 Global Ecosystem

Affordable Talent



Top 5 Activation Ecosystem

Blockchain

Software Startup Output

200-400

Global Avg: 1,010

Ecosystem Value

\$303 m

Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Belgrade and Novi Sad

Low corporate income tax: Tech startups enjoy accelerated R&D deduction (2x) and IP Box (3%) tax regimes, meaning that they pay almost no corporate income tax.

Talented workforce: Startups in Serbia can access affordable, high-quality engineering talent, which ranks among the top five in the world.

Early-Stage Funding Per Startup



\$222 k

Avg: \$284 k

Total Early-Stage Funding



\$67 m

Avg: \$837 m

Software Engineer Salary



\$19.4 k

Avg: \$58.3 k



Busan South Korea

Ecosystem Phase: **Activation**

Sub-Sector Strength: **Marine Tech**

Broader Busan is home to about 90 percent of South Korea's shipbuilding companies, including Hyundai Heavy Industries, Samsung Heavy Industries, and STX. STEM Village, a proposed marine science and technology industry innovation center, will be equipped with an incubation center, marine equipment, sensor inspection and calibration center, STEM fusion research center, and startups. Just over half of the country's marine companies are based in Busan.

Sub-Sector Strength: **Smart Cities**

Busan Metropolitan City and the Busan Center for Creative Economy and Innovation recently announced the Busan Smart City Living Lab, which attracts global smart city startups. The government will operate a Smart City Tech Sandbox in Eco Delta City and has earmarked \$894 million from the Korea Water Resources Corporation for Busan.

Startup Genome Member(s): Busan Center for Creative Economy and Innovation

"From creating a regulation-free sandbox for startups to test within to the Inbound Program facilitating soft landings in our complex economy, the local government plays a critical role in supporting grassroots innovation."

H.K Cho

Director General at Busan Center for Creative Economy and Innovation

Why you should invest in Busan

 Top 20 Global Ecosystem
Affordable Talent

 Top 15 Global Ecosystem
Knowledge

Software Startup Output **200-400**
Global Avg: 1,010

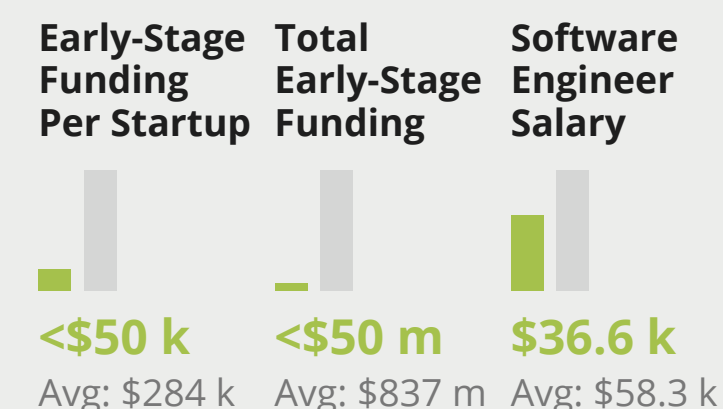
Ecosystem Value **\$161 m**
Global Median: \$5 bn



Reasons to move your startup to Busan

Tax incentives: High-tech, foreign-invested companies receive 100% exemption from corporate income tax for five years. Tax credits are available for technology commercialization investments and merger or acquisition of technologically innovative SMEs.

Strong infrastructure: Home to 17 startup incubators and 10 accelerators, 12 angel groups, 21 funds worth about \$302 million, and the global startup conference Startup Bounce Busan.



Calgary Canada

Ecosystem Phase: **Activation**



Sub-Sector Strength: **Cleantech**

Calgary, the corporate headquarters of Canada's energy sector, is home to 115 of the nation's largest companies. Creative Destruction Labs (CDL) at the University of Calgary's Haskayne School of Business runs a dedicated stream for energy startups. In its first year, the program had 26 ventures join and 13 graduate. Startups involved raised about \$14 million. In addition, Blackline Safety, a manufacturer of safety monitoring technology, raised \$8.2 million and Veerum, an industrial IoT company, raised \$3.3 million in 2018.



Sub-Sector Strength: **Life Sciences**

Home to North America's leading microbiome lab and soon the largest cancer hospital in Canada, Calgary is a leader in health services. The University of Calgary, with its \$360 million annual research budget, recently launched a Life Sciences Innovation Hub. Circle Cardiovascular, a global leader in cardiac imaging solutions, raised \$16 million in Series A funding in 2018.

Startup Genome Member(s): Platform Calgary, Calgary Economic Development (CED)

"Calgary's position, as Canada's headquarter city with bench strength in key industrial sectors, provides startups with the perfect environment to plug into large enterprises in feeding, powering, and moving the world."

David Chavez

Vice President of Platform Calgary

Why you should invest in Calgary



Top 15 Global Ecosystem

Cleantech



Top 5 Activation Ecosystem

Connectedness

Software Startup Output

150-300

Global Avg: 1,010

Ecosystem Value

\$2.7 bn

Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Calgary

Livable and affordable: In 2018, Calgary was named the most livable city in North America, and the fourth-most livable in the world.

Base of talent and knowledge: Calgary has the highest number of patents filed per capita in Canada and 27% of post-secondary graduates are in STEM fields.

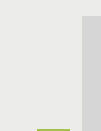
Early-Stage Funding Per Startup



\$173 k

Avg: \$284 k

Total Early-Stage Funding



<\$50 m

Avg: \$837 m

Software Engineer Salary



\$58 k

Avg: \$58.3 k



Edmonton Canada

Ecosystem Phase: **Activation**



Sub-Sector Strength: **AI, Big Data, & Analytics**

The Alberta Machine Intelligence Institute is one of three institutes granted a combined \$125 million as part of a Pan-Canadian AI Strategy. Drivewyze is a leader in Connected Truck Services, and operates North America's largest weigh station bypass service at over 750 sites in 42 states and two provinces. Startup Edmonton works with some of the city's most promising AI companies: in 2018 members raised \$22.2 million.



Sub-Sector Strength: **Life Sciences**

Edmonton has a long history of leading in Life Sciences research and innovation, including creation of the Edmonton Protocol, a treatment for Type 1 diabetes developed at the University of Alberta. Building on successes like this, TEC Edmonton DynaLIFE Accelerator participants identify clinical needs and develop solutions. In 2018, OncoQuest, an Edmonton-based biopharmaceutical company, raised \$7.5 million in 2018.

Startup Genome Member(s): Innovate Edmonton, a division of Edmonton Economic Development Corporation, and its five entrepreneurship and innovation communities - Advanced Technology Centre, Edmonton Made, Innovate YEG, Startup Edmonton, and TEC Edmonton.

"The depth of our innovation community paired with the best environment in Canada for the knowledge-economy workforce makes Edmonton uniquely poised to turn the promise of our AI and machine intelligence research strength into global solutions."

Cheryll Watson

Vice-President of Innovate Edmonton

Why you should invest in Edmonton



Top 5 Activation Ecosystem

Talent



Top 5 Activation Ecosystem

Market Reach

Software Startup Output

125-275

Global Avg: 1,010

Ecosystem Value

<\$100 m

Global Median: \$5 bn

5

Exit Growth Index

8

Output Growth Index

1

Funding Growth Index

Reasons to move your startup to Edmonton

Favorable tax environment: Local companies benefit from the absence of a provincial retail sales tax. Research-intensive startups can claim a 40% tax credit on R&D expenses. The early-stage funding environment is given a boost through a 30% investor tax credit.

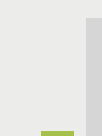
Early-Stage Funding Per Startup



<\$50 k

Avg: \$284 k

Total Early-Stage Funding



<\$50 m

Avg: \$837 m

Software Engineer Salary



\$57.9 k

Avg: \$58.3 k

Indices calculated on a scale of 1 (lowest) to 10 (highest)



Estonia

Ecosystem Phase: **Activation**



Sub-Sector Strength: **Cybersecurity**

Strengthening the Cybersecurity ecosystem has been a governmental focus area since 2017. Supporting activities for Cybersecurity startups include meetup groups, make-athons and hackathons, acceleration program (CyberNorth) and Cyber Security Exercises and Training Centre CR14. In 2018, employment in the sector grew more than 300%. Veriff, a provider of identity verification solutions, raised \$7.7 million in June 2018. Leading Cybersecurity companies, such as CGI, Symantec, and Malwarebytes, have set up R&D bases in Estonia.



Sub-Sector Strength: **Fintech**

Estonia's banking sector assets are valued at around \$29 billion. Estonian Fintech startups employ 1100 people locally and makeup 29% of all jobs created by Estonian startups. Finance Estonia sparks new financial companies — creating jobs, developing the capital market, and offering finance. Transferwise achieved Unicorn status after raising \$280 million in 2017 followed by a \$73 million debt-financing round in 2018.

Startup Genome Member(s): Startup Estonia (Foundation KredEx)

Financed by the European Regional Development Fund (Startup Estonia program number EU50651)

"Estonia's e-governance provides you smooth, hassle-free location independent access to all public services. Interlinked with the private sector service providers, it minimizes the time spent talking to the government. And time is everything in the startup field."

Viljar Lubi

Deputy Secretary General, Economic Development, Ministry of Economic Affairs and Communications for Estonia

Why you should invest in Estonia



Top 10 Global Ecosystem

Affordable Talent



Top 5 Activation Ecosystem

Fintech

Software Startup Output **500-700**
Global Avg: 1,010

Ecosystem Value **\$1.2 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



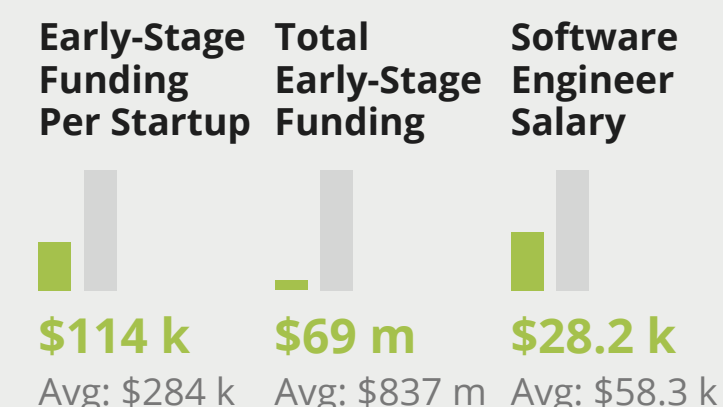
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Estonia

Easy to operate: Estonia is a global pioneer in digital government services, to the benefit of entrepreneurs. The e-business registry allows companies to quickly establish themselves online.

E-Residency program: Enables digital entrepreneurs to register an EU-based company entirely online from anywhere in the world.



Frankfurt Germany

Ecosystem Phase: **Activation**

Sub-Sector Strength: **Cybersecurity**

More than 450 researchers in Darmstadt, a city near Frankfurt, are focused on cybersecurity and their activities are aggregated within the Center for Research in Security and Privacy. Acellere, a startup minimizing code errors and task prioritization, raised \$2.5 million in a Series A round in 2018.

Sub-Sector Strength: **Fintech**

Home to the European Central Bank, Deutsche Bundesbank, the Frankfurt Stock Exchange, and 85 multinational banking headquarters, Frankfurt has both Fintech talent and corporate demand for innovation. Many German and international banks in the city have Fintech programs, including Deutsche Bank's Digitalfabrik and Helaba Digital. Over 50% of local VC investment went into Fintech startups between 2012 and 2017 and the largest German Fintech exit of all time took place in Frankfurt when Forex trading company 360T was acquired by Deutsche Börse for \$800 million in 2015.

Startup Genome Member(s): TechQuartier

"Frankfurt Rhine-Main's entrepreneurial ecosystem is leveraging its strengths in Fintech, AI, and tech talent. Nearly every university is involved and there's a recent uptick in public investment and cross-ecosystem collaboration."

Gemma Ferst

Ecosystem Manager, TechQuartier/HTAI

Why you should invest in Frankfurt

 Top 20 Global Ecosystem **Knowledge**

 Top 25 Global Ecosystem **Fintech**

Software Startup Output **300-500**
Global Avg: 1,010

Ecosystem Value **\$1.7 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



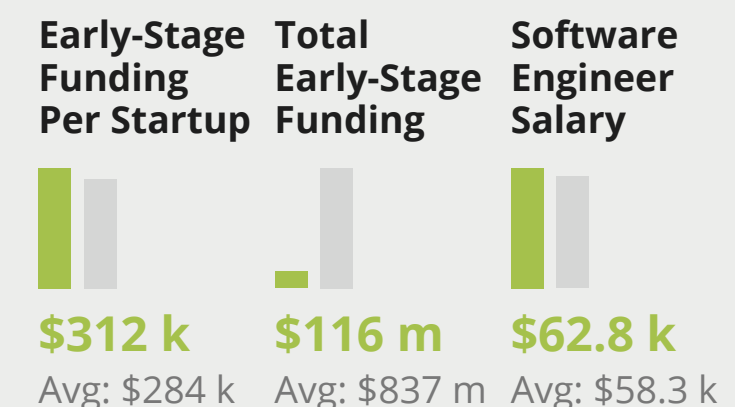
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Frankfurt

Abundant resources: There are over 3,300 angel investors in Frankfurt. Startups in Frankfurt enjoy a supportive environment that includes 32 incubators, 24 coworking spaces, and 10 accelerators.

Access to talent: Frankfurt boasts talent from top universities like Technische Universität Darmstadt and Goethe University.



Lithuania

Ecosystem Phase: **Activation**

Sub-Sector Strength: **Fintech**

The Bank of Lithuania offers a Fintech regulatory sandbox. Lithuanian Fintech startups have access to 34 countries through the CENTROLink system which provides gateway to the Single Euro Payments Area (SEPA), and can issue their own IBANs through Bank of Lithuania APIs. In 2018, the number of companies in the country's Fintech ecosystem grew by 45 percent. Local startups in Fintech are joined by a number of global players including Revolut and Earthport. Lithuania-based TransferGo raised \$17.6 million in 2018.

Sub-Sector Strength: **Mobility**

Dana Incorporated, which engineers solutions for powered vehicles and machinery, is opening a new service center in Lithuania. Vilnius-based mobility startup Trafi, official travel planner app of the 2016 Olympics, raised \$7 million Series B round and launched world's first mobility as a service in Vilnius in 2017, then Berlin in 2019. Car sharing startup CityBee raised \$124 million in a venture round in 2018. Five companies — CityBee, Flash, MyScoote, Swop & Unicorn Scooters —are developing a scooter-sharing system.

Startup Genome Member(s): Startup Lithuania, powered by Enterprise Lithuania

"We have growing and vibrant startup ecosystem - the number of startups is constantly growing, Lithuanian startups attracted record investments in 2018, new players are engaging in the ecosystem."

Roberta Rudokienė

Head of Startup Lithuania

Why you should invest in Lithuania

 Top 10 Global Ecosystem
Affordable Talent

Software Startup Output **850-1,050**
Global Avg: 1,010

Ecosystem Value **\$156 m**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

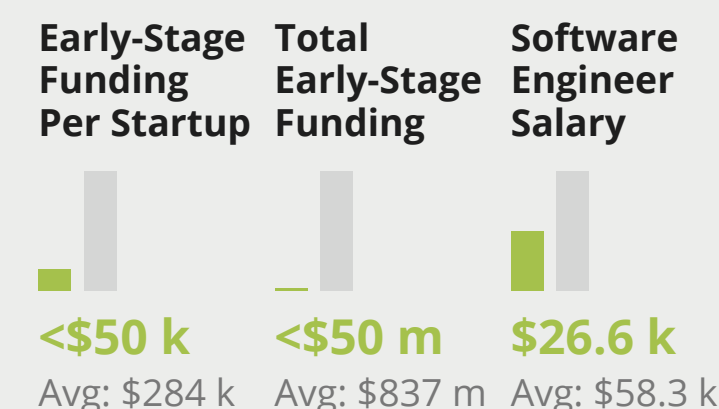
Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Lithuania

Attraction policy: Unlike most countries, Lithuania's Startup Visa Programme has no capital or employment requirements.

Universities: Vilnius University, Vilnius Gediminas Technical University, and others support Sunrise Valley Science and Technology Park which provides space, support, and talent.

Ease of doing business: It takes three days to start a business, and Lithuania ranks 14th for ease of doing business globally.



Manila Philippines

Ecosystem Phase: **Activation**

The Philippines' Department of Trade and Industry's Startup Ecosystem Development Program, rebranded as Startup Pilipinas, is a five-point action plan developed to foster and strengthen networks to create scalable, high-impact startups that will drive innovation, sustain economic growth, and generate employment opportunities. The program includes creating a national startup business council and establishing a Philippines-based startup economic zone.

Sub-Sector Strength: **Fintech**

Fintech companies make up 15% of Manila's startups. The transaction value of the Fintech market in the Philippines reached roughly \$5.7 billion in 2018 and is expected to hit \$10.5 billion by 2022. First Circle, which provides supply chain financing, raised \$26 million in 2018. Close by in Rizal, Coins.ph was acquired for \$72 million in 2019 and in Mandaluyong, Voyager Innovations was acquired for \$215 million in 2018.

Startup Genome Member(s): Department of Trade and Industry

"In late 2018 and early 2019, we've seen how local and international investors have noticed the potential of Philippine startups and it's caused an inflection point in terms of deals."

Adrià Villarroya Viñas

Program Lead for Startup Development at QBO Innovation Hub

Why you should invest in Manila

 Top 10 Global Ecosystem

 **Bang for Buck**

 Top 5 Activation Ecosystem

 **Connectedness**

Software Startup Output **400-600**
Global Avg: 1,010

Ecosystem Value **\$378 m**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



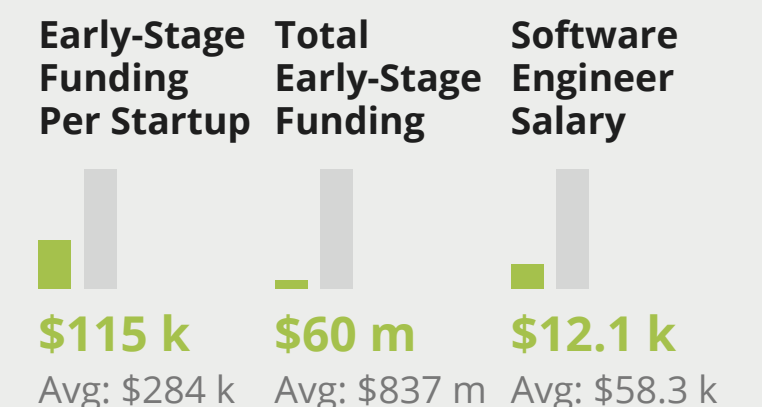
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Manila

Experienced tech talent: The well-established outsourcing industry, built around talent from Philippines' universities and strong English-language skills, gives founders an experienced set of employees to access.

Startup support: The Youth Entrepreneurship Act promotes finance and startup skills, while the Philippine Innovation Act and the Innovative Startup Act of the Philippines aim to foster an innovative entrepreneurial culture.



Mid-East Region Ireland

Ecosystem Phase: **Activation**

The three counties of the Mid-East region—Meath, Kildare, and Wicklow—border Dublin and host several global technology companies, including Intel and Facebook. Ireland’s government supports startups through Enterprise Ireland and 31 Local Enterprise Offices, which offer mentoring, investment, and training out of local government buildings.

 Sub-Sector Strength: **Agtech & New Food**

Ireland’s food industry is projected to be worth \$21.6 billion by 2025 and currently represents 12.3 percent of the country’s total export revenue. The Boyne Valley Food Innovation District (BVFID), centred in the Mid-East Region, acts as a base for some of Ireland’s leading indigenous and high-growth food businesses such as Dawn Farms, Kerry Foods, and Epicom. These three companies have each made recent significant investments in their R&D capabilities, including a \$28.3 million investment by Dawn Farms into its Meat Science & Innovation Centre in Naas. BVFID was recently awarded \$1.7 million by the Regional Enterprise Development Fund to support indigenous food companies and enable them to scale globally.

Startup Genome Member(s): Meath Enterprise

“An exciting vision is emerging in the Mid-East region in creative industries, Agtech, and a network of innovation spaces. This bottom up regional development approach ensures the region is poised for significant growth.”

Michael Brougham, PhD
Regional Director at Enterprise Ireland

Why you should invest in Mid-East Region

 Top 20 Global Ecosystem
Affordable Talent

Software Startup Output **<100**
Global Avg: 1,010

Ecosystem Value **\$150 m**
Global Median: \$5 bn



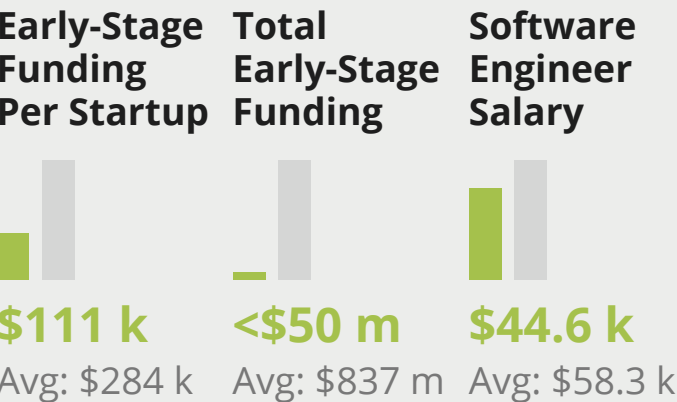
Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Mid-East Region

R&D tax credits: Research-intensive startups can take advantage of tax credits at 25 percent of qualifying R&D costs.

Attractive tax rates; At 12.5 percent, Ireland’s corporate tax rate is one of the lowest in Europe.

Low cost; Cost savings continue with \$44,583 as the average cost of a software engineer — lower than Western Europe counterparts.



New Zealand

Ecosystem Phase: **Activation**

New Zealand has seen a number of its tech startups grow over time, such as Xero in Wellington, which now sells in more than 180 countries, and Auckland-based Grinding Gear Games, acquired by Tencent in 2018 for more than \$100 million.

Sub-Sector Strength: **Agtech & New Food**

New Zealand is the largest dairy exporter in the world and a global supplier of meat and wool. Over 40 Agtech startups — representing 20% of seed activity by deal value in NZ — have been founded since 2013. Robotics Plus, an agricultural automation company, raised \$8 million in 2018. Bio-Lumic, a UV technology startup, raised \$5 million in 2018.

Sub-Sector Strength: **Life Sciences**

A new \$7.1 million biomedical research technology hub is being built at the Malaghan Institute at the Victoria University Wellington. In 2017, Auckland-based Upside Biotechnologies raised \$1.7 million from Ice Angels and Tuhua Fund.

Startup Genome Member(s): Ministry of Business, Innovation and Employment

“There are positive signs NZ’s startup system is evolving and the pace of progress is picking up. An example is the growing number of startups achieving ‘unicorn’ status.”

Erica Lloyd

General Manager (Market and Sectors), Callaghan Innovation

Why you should invest in New Zealand

 Top 10 Global Ecosystem
Agtech & New Food

 Top 5 Global Ecosystem
Bang for buck

Software Startup Output **500-600**
Global Avg: 1,010

Ecosystem Value **\$1.4 bn**
Global Median: \$5 bn

5
Exit Growth Index

6
Output Growth Index

2
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to New Zealand

Startup in half a day: New Zealand is the number one country in the world for ease of doing business with the shortest time to start a business and #1 globally for corruption transparency.

Tax credits: A 15% tax credit to businesses investing in R&D offer support to pre-profit businesses, such as start-ups, by making it refundable.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
		
\$279 k	\$150 m	\$49.1 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Nur-Sultan Kazakhstan

Ecosystem Phase: **Activation**

Sub-Sector Strength: **Fintech**

In 2018, the Astana International Financial Center introduced the Fintech Regulatory Sandbox and visa-free entry for citizens of 65 countries, including all OECD countries. Invest Online, launched by the National Bank of Kazakhstan, is a blockchain-based mobile securities trading application which allows people to buy discount bank notes. Senim, a smart wallet provider, raised \$120,000 in a Series A round in 2018.

Sub-Sector Strength: **Smart Cities**

The Digital Kazakhstan State Program is the most well-funded program in Kazakhstan with a budget of over \$1 billion and 120 initiatives across five key areas. The Astana Innovations Challenge 2018 launched with the aim of implementing a Smart City concept and organized its first Open Data Hackathon in February 2018. The Smart Sustainable City acceleration hub includes the implementation of 10 to 15 startup solutions into the government's infrastructure.

Startup Genome Member(s): Astana Hub, "Zerde" National Infocommunication Holding

"Kazakhstan's market provides an opportunity for startups to pilot their solutions, interact with large local and international corporations, who are open to cooperation with startups, and a possibility of entering the neighboring markets of Russia, China, etc."

Pavel Koktyshev

Deputy Chairman of the Board, "Zerde" National Infocommunication Holding

Why you should invest in Nur-Sultan

 Top 5 Global Ecosystem
Affordable Talent

Software Startup Output **50-150**
Global Avg: 1,010

Ecosystem Value **<\$100 m**
Global Median: \$5 bn

5

Exit Growth Index

9

Output Growth Index

1

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Nur-Sultan

Ease of doing business: In 2018, after introducing reforms to registration and trading, Kazakhstan ranked among the world's top 30 economies in ease of doing business.

Support to startups: Nur-Sultan offers tax preferences, grant financing, and a unique visa regime that allows foreign partners to get a work visa for up to 5 years.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
<\$50 k	<\$50 m	\$15.6 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Québec City Canada

Ecosystem Phase: **Activation**



Sub-Sector Strength: **AI, Big Data, & Analytics**

COVEO, an AI-powered search startup, announced a \$100 million private equity investment in 2018. The national government's \$950-million Innovation Superclusters initiative supports the SCALE.AI project, an important source of economic growth and collective wealth for Canada, but also for the province of Québec and the Québec City region. The SCALE.AI project is supported by OPTEL GROUP, COVEO and Université Laval, as well as Bentley and other key players from the business and innovation world of Québec City.



Sub-Sector Strength: **Life Sciences**

Québec City has expertise in biopharmaceuticals (vaccines), medical technologies and cosmeceuticals. As a recognized skills hub, it is home to 84 R&D centers, chairs, and research labs as well as various internationally acclaimed researchers, and has successfully transformed research and innovation into powerful growth drivers (CRI, CERVO). In 2018, Medicago announced a \$245 million investment in a new vaccine production facility, and Feldan Therapeutics raised \$13 million in a Series A round.

Startup Genome Member(s): Québec International

"Driven by a strong sense of pride and thirst for innovation, Québec is a city where people join forces and fully embrace our shared goals to rise above fray."

Carl Viel

President & CEO at Québec International

Why you should invest in Québec City



Top 20 Global Ecosystem

Market Reach



Top 20 Global Ecosystem

Affordable Talent

Software Startup Output **200-300**
Global Avg: 1,010

Ecosystem Value **<\$100 m**
Global Median: \$5 bn

5

Exit Growth Index

8

Output Growth Index

3

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Québec City

Entrepreneur development: UBI Global recognized Entrepreneuriat Laval as the second-best university accelerator in the world. École D'Entrepreneurship De Beauce, the only school in Canada focusing on the development of entrepreneurs, is also based in the Québec City region.

Early-Stage Funding Per Startup **\$71 k**
Avg: \$284 k



Total Early-Stage Funding **<\$50 m**
Avg: \$837 m



Software Engineer Salary **\$43.5 k**
Avg: \$58.3 k



San Bernardino County United States

Ecosystem Phase: **Activation**

Since 2010, San Bernardino County has added 130,000 jobs to the region, the sixth fastest growth in employment among all counties in California. The County's Vision2Succeed initiative supports businesses by coordinating all County school districts, major universities, community colleges, and local businesses to align skills-based training with job opportunities. In addition, the County has forged strong partnerships with Inland Empire Center for Entrepreneurship at California State University, San Bernardino as well as Inland Empire Small Business Development Center.



Sub-Sector Strength: **Adv. Manufacturing & Robotics**

Career education programs in the San Bernardino Community College District received \$1 million to launch the Advanced Manufacturing Futures Initiative, a program built to meet the demand of qualified manufacturing and production sector workers. More than 4,300 mature advanced manufacturing businesses operate in San Bernardino County and neighboring Riverside County.

Startup Genome Member(s): County of San Bernardino Economic Development Agency

"The biggest strength of San Bernardino County's manufacturing sector is its diversity. We're strong in Industrial Manufacturing, Aerospace, Advanced Manufacturing, and Consumer Products Manufacturing."

Mike Stull

Professor of Entrepreneurship and Director of IECE at the College of Business and Public Administration of California State University, San Bernardino

Why you should invest in San Bernardino County



Top 5 Activation Ecosystem

Adv. Manufacturing & Robotics

Software Startup Output **300-500**
Global Avg: 1,010

Ecosystem Value **\$642 m**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to San Bernardino County

Young workforce: Time magazine ranked San Bernardino County third in the U.S. as a destination for millennials.

Affordable real estate: With home prices 50 to 60% less than coastal counterparts (L.A. and Orange Counties), San Bernardino County offers an attractive and affordable Southern California lifestyle.

Early-Stage Funding Per Startup **Total Early-Stage Funding** **Software Engineer Salary**



\$121 k **<\$50 m** **\$89.2 k**

Avg: \$284 k Avg: \$837 m Avg: \$58.3 k



Taipei City Taiwan

Ecosystem Phase: **Activation**

Sub-Sector Strength: **AI, Big Data, & Analytics**

iKala, an AI-driven marketing technology startup, raised \$5 million in a Series A round in 2018, followed by a \$10 million Series A+ round in 2019. The company is also a leading Google Cloud partner in East Asia. Microsoft is spending over \$30 million to build an AI research and development hub, which will eventually house nearly 200 researchers.

Sub-Sector Strength: **Adv. Manufacturing & Robotics**

Taiwan makes 75% of personal computers, 50% of LCD screens, 25% of semiconductors, and 20% of smartphones globally. The island is home to Taiwan Semiconductor Manufacturing Company (TSMC), the world's largest contract chipmaker. Computer and hardware developers Acer and ASUS, electronics manufacturer Foxconn, and mobile phone giant HTC are all headquartered in the Taipei City ecosystem. Success stories include Robotelf Technologies, which won the CES 2018 Innovation Award for its home-use robot Robelf.

Startup Genome Member(s): Taiwan Tech Arena

"Since 2010, the Taipei City ecosystem has learned step by step to concentrate efforts and talent by focusing on clusters, specifically in pharmaceuticals, life sciences, and precision robotics."

Dr. Lewis Chen

Managing Director at Taiwan Technology Arena

Why you should invest in Taipei City

-  Top 25 Global Ecosystem
Adv. Manufacturing & Robotics
-  Top 30 Global Ecosystem
Artificial Intelligence

Software Startup Output **550-750**
Global Avg: 1,010

Ecosystem Value **\$2.4 bn**
Global Median: \$5 bn

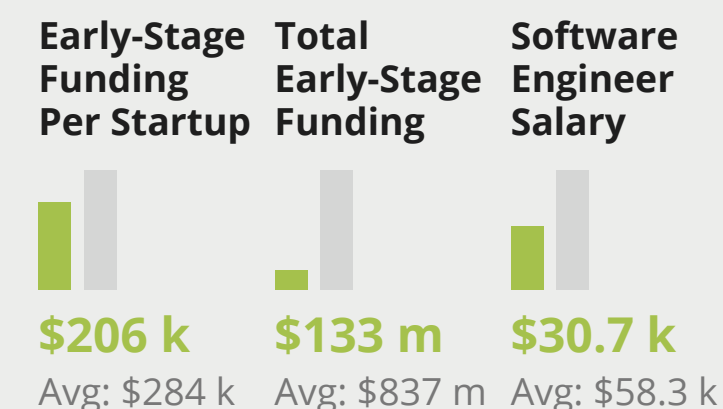


Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Taipei City

Local venture capital investors: Taiwan has about 200 venture capital funds in the Taiwan Venture Capital Association. Taiwan's National Development Council has invested \$83 million in four different venture capital firms to foster local startup growth.

Employment Gold Card: Since 2018, Taiwan has issued 65 Employment Gold Cards, which combine an Alien Resident Certificate, resident visa, work permit, and re-entry permit.



Western Denmark Denmark

Ecosystem Phase: **Activation**



Sub-Sector Strength: **Adv. Manufacturing & Robotics**

Denmark's cluster of emerging robotics companies, primarily located in Odense, employs more than 2,300 people. The Danish Technological Institute's Robot Technology is the leading institutional recipient of European Union funding for robot innovation. One clear indication of success was that Universal Robots, an Odense startup, was acquired by U.S.-based Teradyne in 2015 for \$285 million.



Sub-Sector Strength: **Life Sciences**

In 2014, Cetrea — a hospital IT solutions provider — was acquired for \$13.9 million. A software for bioinformatics startup, CLC Bio, was acquired by Dutch/German Qiagen Group for \$75 million. The Novo Nordisk Foundation will invest \$150 million over the next four years to support the Danish National Genome Center including one facility in Aarhus. Aarhus University & Aalborg University are home to research activities in the fields of health science and technology.

Startup Genome Member(s): Digital Hub Denmark

"Higher education is free in Western Denmark. Without the burden of student loan debt, entrepreneurs have the financial freedom to pursue something interesting and innovative, bootstrap their businesses, and spend time in local incubators."

Mikkel Fledelius Jensen

Managing Director at Game Hub Denmark

Why you should invest in Western Denmark



Top 20 Global Ecosystem

Adv. Manufacturing & Robotics

Software Startup Output **450-750**
Global Avg: 1,010

Ecosystem Value **\$835 m**
Global Median: \$5 bn

5

Exit Growth Index

10

Output Growth Index

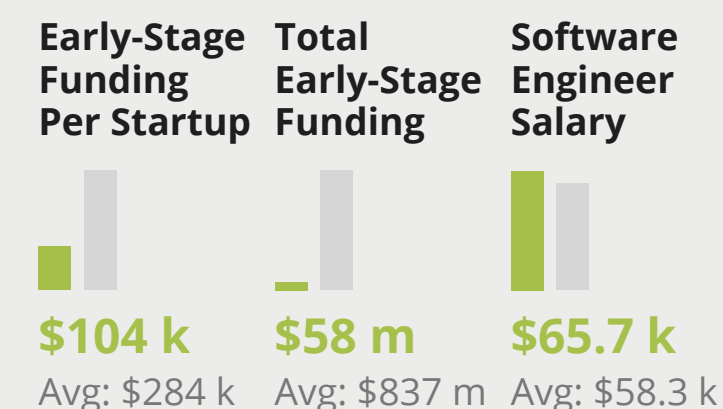
9

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Western Denmark

Operational ease: Denmark is the #1 country in the European Union for ease of doing business. Among the EU nations, Denmark topped the ranking in the Digital Economy and Society Index 2018, including ranking #1 in Integration of Digital Technology.



Ecosystem Deep Dives

Early-Globalization Phase

112	Antwerp, BE	118	Madrid, ES
113	Barcelona, ES	119	Melbourne, AU
114	Copenhagen, DK	120	Montreal, CA
115	Greater Helsinki, FI	121	Rhineland, DE
116	Houston, US	122	Seoul, KR
117	Jerusalem, IL	123	Tokyo, JP

Early-Globalization Phase Ecosystems

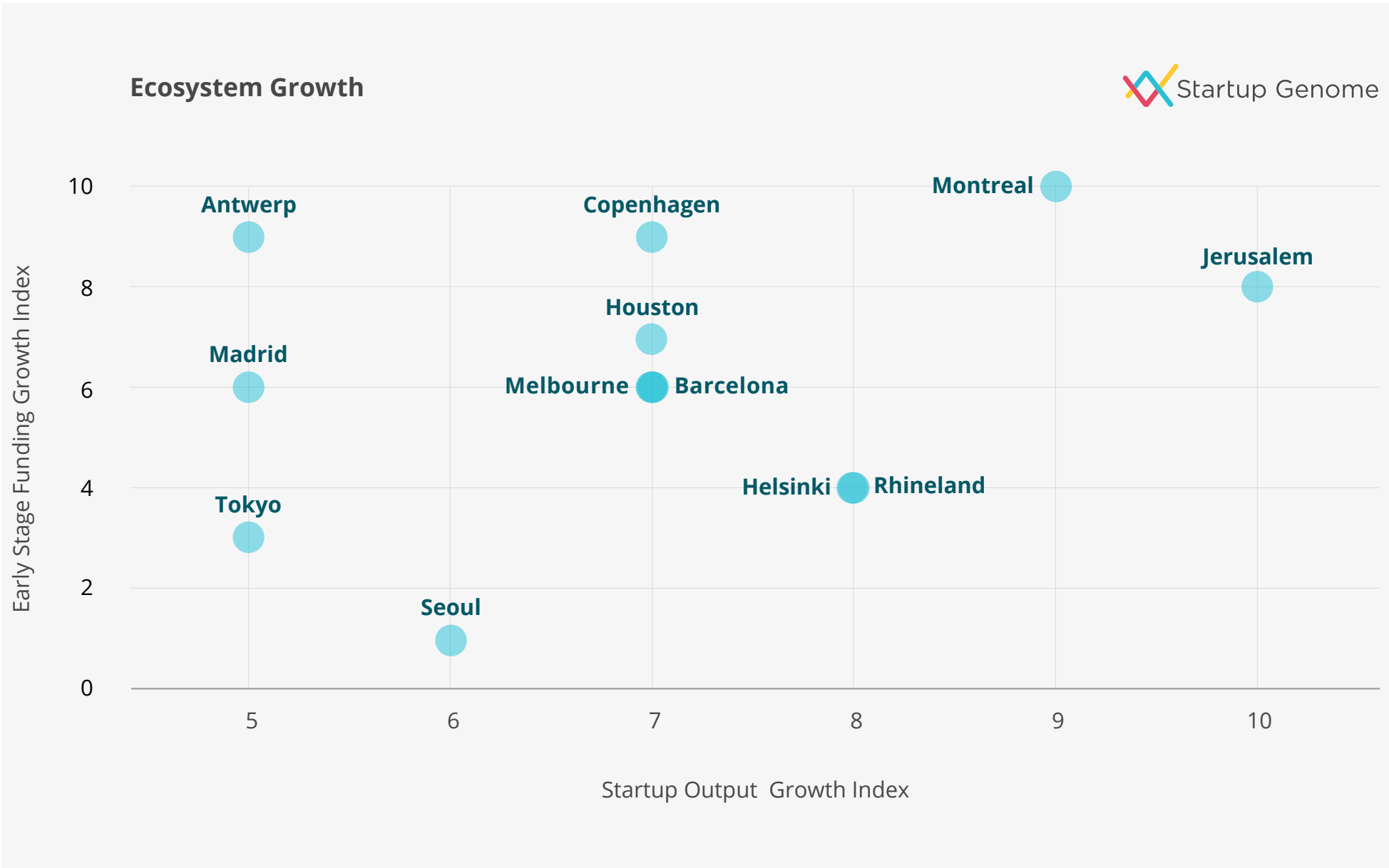
Key Objective for Early-Globalization Phase Ecosystems

1. Global Connectedness: Top 5 Ecosystems

- Helsinki
- Melbourne
- Jerusalem
- Copenhagen
- Montreal

2. Early-Stage Funding per Startup: Top 5 ecosystems

Ecosystem	Early Stage Funding per Startup (\$)
Montreal	\$374 k
Tokyo	\$336 k
Helsinki	\$306 k
Barcelona	\$292 k
Jerusalem	\$267 k



Antwerp Belgium

Ecosystem Phase: **Early-Globalization**



Sub-Sector Strength: **Life Sciences**

Flanders has five universities with life sciences departments and research teams and four academic hospitals for research collaboration. Additionally, Antwerp-based imec is Europe's largest independent nanotech R&D center and is developing innovative tools for the life sciences. Home to a concentration of hospitals and with the presence of Institute of the Tropical Medicine and Bluehealth Innovation Center, Antwerp is the perfect breeding ground for innovation in healthcare.



Sub-Sector Strength: **Smart Cities**

The city of Antwerp, the region of Flanders and IMEC are collaborating to make Antwerp and its port a smart city living lab to help startups test and commercialize their products. Since 2014, more than 120 smart city projects in Belgium worth around \$1.1 billion have been financed by the European Investment Bank and Belfius. The Beacon, an innovation hub for IoT and AI, was launched in 2018 with a focus on Industry 4.0, logistics, and Smart Cities.

Startup Genome Member(s): City of Antwerp

"Antwerp has a very strong economic backbone for startups to leverage, with the second largest port in Europe and the second largest oil and chemical cluster in the world."

Claude Marinower

Vice Mayor for Economy, Innovation, and Digitalisation

Why you should invest in Antwerp



Top 30 Global Ecosystem

Funding

Software Startup Output **900-1,300**
Global Avg: 1,010

Ecosystem Value **\$7.7 bn**
Global Median: \$5 bn

9

Exit Growth Index

5

Output Growth Index

9

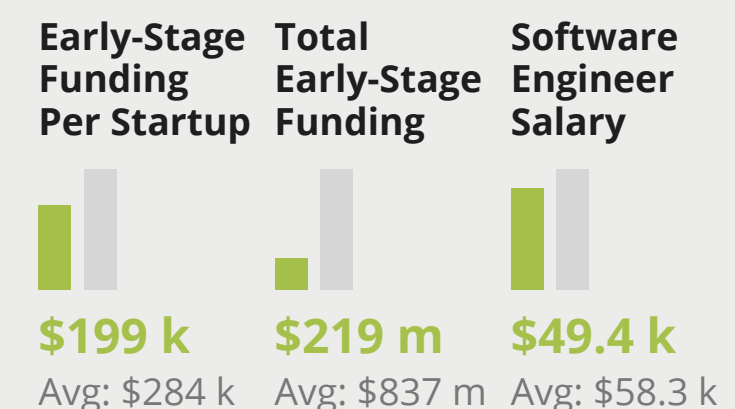
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Antwerp

Strong infrastructure: Includes nine incubators and accelerators, a Start-upVillage facility for growing startups, and university research centers.

R&D support: Organizations can deduct up to 85% of their net innovation income from their taxable base. The Flanders Innovation & Entrepreneurship agency provides structural funding of up to 60%.



Top 30 Global Ecosystem

Barcelona Spain

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: **Gaming**

Catalonia is home to over 130 gaming companies with approximately \$365 million in revenue. Major global players like Ubisoft and I Got Games have set up their European headquarters in Barcelona, and events such as Barcelona Games World attract 150,000 people each year. In 2017, Social Point was acquired for \$270 million. Scopely, a North American gaming platform settled up its Barcelona headquarters in 2017 and now is doubling its workforce there.

Sub-Sector Strength: **Life Sciences**

Barcelona has over 100 digital health startups and hundreds of health care events, including Eyeforpharma and Bio Europe Spring. The European branch of the Health Information Management Systems Society has opened an office in Barcelona's Health Hub. In 2018, Minoryx Therapeutics, a disease therapy developer, raised \$25 million and patient testing solutions startup STAT-DX, was acquired for \$191 million.

Startup Genome Member(s): Catalonia Trade & Investment

"Barcelona is one of the most competitive European startup hubs with lots of multinational enterprise innovation centers and access to local and international talent and VC investment."

Jordi Aguasca
Manager at Startup Catalonia

Why you should invest in Barcelona

-  Top 15 Global Ecosystem **Bang for Buck**
-  Top 15 Global Ecosystem **Gaming**

Software Startup Output **1k-1.4k**
Global Avg: 1,010

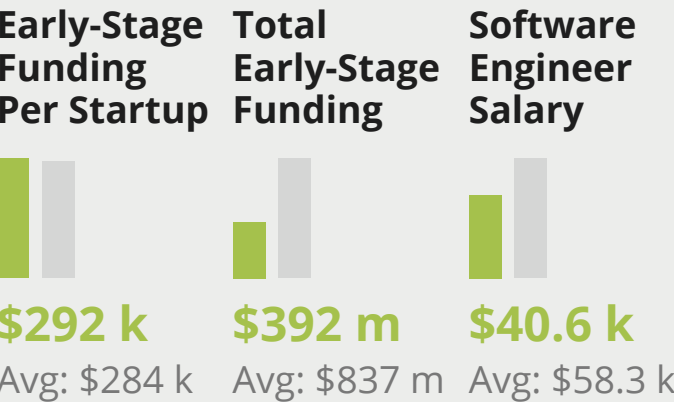
Ecosystem Value **\$4.1 bn**
Global Median: \$5 bn



Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Barcelona

Center of gravity: Barcelona plays host to major international events such as the Mobile World Congress (MWC) and Smart City Expo. These bring together multinational companies and startups and make the ecosystem a focal point for launching new ideas and building connectedness. Alongside MWC, the 4YFN event for startups has developed into a global platform.



Copenhagen Denmark

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: **Edtech**

Denmark is #1 in Scandinavia and #2 in the world in education investments, according to the OECD. Recently, the Danish Growth Fund made its largest investment, \$30 million, in Area9 Lyceum. Labster, a startup that creates digital tools to help students, raised \$21 million in a Series B round in 2019. Lead investors included the London-based venture capital firm, Balderton Capital.

Sub-Sector Strength: **Fintech**

Copenhagen Fintech is a vibrant community of Fintech startups and corporate financial institutions. Danske Bank—the largest bank in Denmark—has joined forces with Nykredit, Accelerace, and Copenhagen Fintech to create a Fintech accelerator that has secured funding from the Danish Industry Foundation. Copenhagen has fostered high-growth Fintech startups such as Tradeshift, a unicorn (now based in San Francisco) that raised \$250 million in 2018, giving it a valuation of \$1.1 billion.

Startup Genome Member(s): Digital Hub Denmark

“The ecosystem is at its best yet. With recent unicorns, scaleups, and great successes, we have reached a critical mass and more investors are setting up a presence here.”

Tommy Andersen

Managing Partner of byFounders and Chairman at The Danish Government’s Entrepreneurial Panel

Why you should invest in Copenhagen

 Top 20 Global Ecosystem
Fintech

 Top 20 Global Ecosystem
Edtech

Software Startup Output **750-1,050**
Global Avg: 1,010

Ecosystem Value **\$4.6 bn**
Global Median: \$5 bn

4

Exit Growth Index

7

Output Growth Index

9

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Copenhagen

Talent and training: Denmark has been a world leader in entrepreneurship education through the Danish Foundation for Entrepreneurship. There is a strong lineage of technical talent in the ecosystem, too: Pascal, Realm, C#, C++, and Unity programming languages were developed here. The innovative Technical University of Denmark has catalyzed approximately 2,200 businesses.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$242 k	\$214 m	\$69.7 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Greater Helsinki Finland

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: AI, Big Data, & Analytics

Finland was the first EU country to publish a National AI Strategy, in June 2017. The free AI education program created by Reaktor and the University of Helsinki had nearly 90,000 people from 80 countries enrolled in the first four months, making ‘Elements of AI’ Finland’s most popular online course. Giosg, an AI customer behavior tool, raised \$5.3 million in venture funding led by Varenne Investment, and ZenRobotics, which uses AI-powered robots to sort through trash, raised \$17 million in funding.

Sub-Sector Strength: Gaming

Finland is among Europe’s top three countries in digital game development with 250 gaming enterprises — 30 of them exceed \$1 million in annual sales. Finnish games, including Angry Birds and Clash of Clans, have been played by over a billion people globally. Docomo, a Japanese mobile operator, invested an undisclosed amount in Hatch in 2019, a spin-off of Angry Bird’s creator Rovio, to bring 5G gaming to Japan. In 2018, Small Giant Games was acquired by Zynga in a deal worth up to \$700 million.

Startup Genome Member(s): Helsinki Business Hub

“Helsinki’s ecosystem is unique through its connectedness and ambition level. World-changing solutions are born out of encounters, joint efforts, and quick experiments, and Helsinki offers a functional and attractive platform for this.”

Jan Vapaavuori
Mayor of Helsinki

Why you should invest in Greater Helsinki

- Top 10 Global Ecosystem **Connectedness**
- Top 20 Global Ecosystem **Gaming**

Software Startup Output **600-900**
Global Avg: 1,010

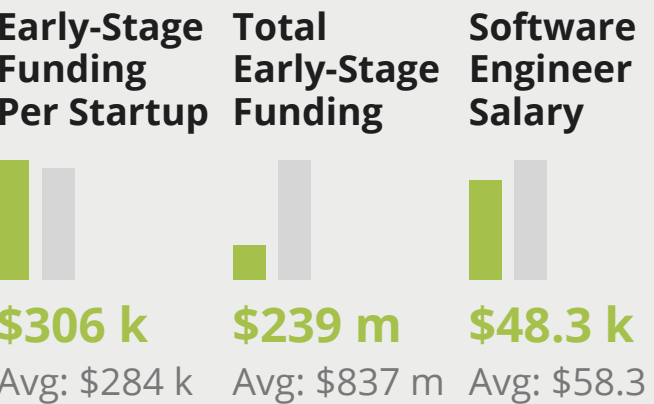
Ecosystem Value **\$3.4 bn**
Global Median: \$5 bn



Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Greater Helsinki

Low cost, high quality: The Greater Helsinki region offers entrepreneurs all the benefits of a Scandinavian lifestyle at a lower cost of living than larger tech hubs. Startups can hire excellent local talent at lower salaries than other ecosystems. The area attracts founders and investors from across the world to Slush each November, which has become a major global event.



Houston United States

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: AI, Big Data, & Analytics

Houston has the world’s biggest concentration of Forbes 2000 energy companies. This corporate presence is leveraged by AI startups like Arundo Analytics, an oil and gas centric startup which recently raised \$25 million. Zdaly, a data search platform, raised \$1.5 million in 2018. Houston-based Mercury Fund, an early-stage VC firm with over \$275 million under management, focus specifically on Data Science and AI platforms.

Sub-Sector Strength: Life Sciences

Houston is home to 21 research organizations, eight R&D hospitals, and the largest medical complex in the world — the Texas Medical Center and its TMCx accelerator. Life Sciences research in Houston secured \$143 million in grants between 2013 and 2018. Success stories include Onco-Response, a cancer research startup, which raised \$40 million in a Series B round in 2018; and Lasergen, a biotechnology company developing genomic applications, acquired for \$105 million in 2018.

Startup Genome Member(s): Houston Exponential

“Houston is now home to approximately 15 venture funds, compared to only one fund a little over 2 years ago. The funding environment is thriving and runway capital goes further here.”

Jon Nordby
Director of Strategy at Houston Exponential

Why you should invest in Houston

- Top 25 Global Ecosystem **Talent**
- Top 25 Global Ecosystem **Life Sciences**

Software Startup Output **1k-1.4k**
Global Avg: 1,010

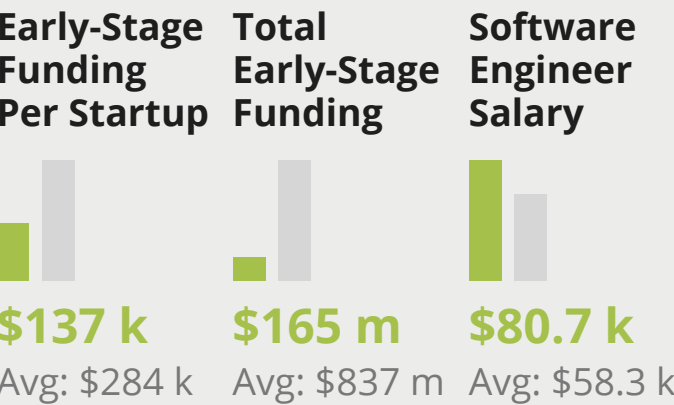
Ecosystem Value **\$1.3 bn**
Global Median: \$5 bn



Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Houston

Startup and corporate density: Houston is among the 30 largest eco-systems in the world in terms of tech startups and home to the fourth largest concentration of large U.S. corporates. This density led to the HX Venture Fund, a corporate fund of funds sourcing over \$50 million from local corporations.



Jerusalem Israel

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: **AI, Big Data, & Analytics**

Mobileye was acquired by Intel for \$15 billion in 2017 — the largest acquisition of an Israeli tech company to date. As a result, Jerusalem is becoming Intel’s world center for ‘Autonomous Vehicles’ and the largest AI-focused R&D center in Israel. The computer science school at The Hebrew University of Jerusalem is the largest in Israel with multiple research groups on AI and Analytics. DataHack, the largest data-science hackathon and community in Israel, is based in Jerusalem.

Sub-Sector Strength: **Life Sciences**

Jerusalem is the leading Life Sciences cluster in Israel, with the highest density of Life Sciences startups in the country and highest in the world, together with San Diego. The Ministry of Jerusalem and Heritage, Jerusalem Development Authority, and LR Group set up the \$130 million Jerusalem Biotech Fund. Jerusalem has roughly 150 Life Sciences companies including Orcam, the first and only Israeli digital health unicorn, BrainQ, which raised \$8.8 million in May 2018, and Anchiano Therapeutics (formerly known as BioCancell). The Biohouse workspace inside Hadassah Hospital serves as a startup laboratory and home base for IBM’s digital health accelerator. BioGiv’s lab space for Life Sciences companies provides an academic IP-free zone.

Startup Genome Member(s): Jerusalem Development Authority

“Jerusalem should be a light to the world from a creative and innovation perspective. It is a place where new solutions emerge that can solve real-world problems in health, automotive, and any industry that can make life better.”

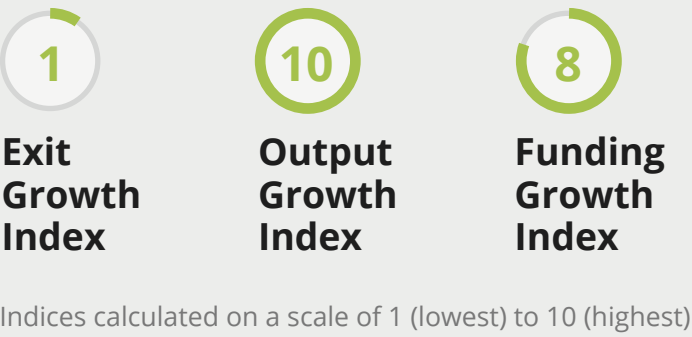
Oded Barel-Sabag
Executive Director of Jnext at The Jerusalem Development Authority

Why you should invest in Jerusalem

- Top 20 Global Ecosystem **Artificial Intelligence**
- Top 10 Global Ecosystem **Life Sciences**

Software Startup Output **600-900**
Global Avg: 1,010

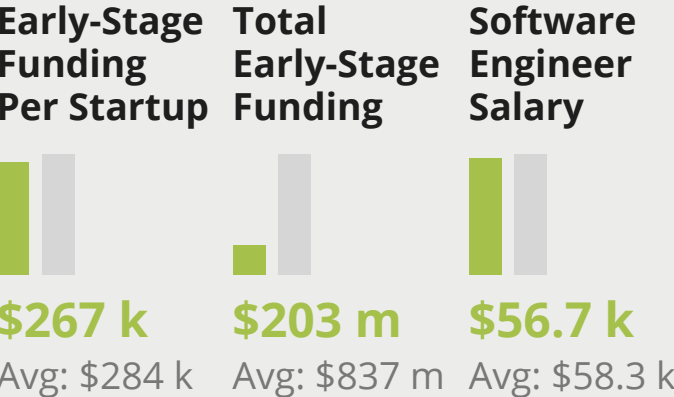
Ecosystem Value **\$2.6 bn**
Global Median: \$5 bn



Reasons to move your startup to Jerusalem

Cutting-edge academic institutions: Home to Israel’s leading universities such as The Hebrew University and Bezalel Academy of Art & Design, which play significant roles in the creation of startups and fueling the ecosystem with new talent.

Financial benefits: Jerusalem, a national priority development area, offers tax benefits and grants of up to \$165,000 for tech and up to \$1 million for Life sciences companies.



Madrid Spain

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: **Fintech**

Around 19% of Spain’s financial services firms are headquartered in Madrid and 72% of the banking activity is executed by Madrid-based banks. In March 2019, Pagantis, a provider of consumer finance for e-commerce transactions, raised \$73 million in a Series B round led by Rinkelberg Capital. Madrid is also the most competitive financial center in Southern Europe according to the latest Global Financial Centres Index.

Sub-Sector Strength: **Life Sciences**

Madrid is home to some of Spain’s best universities specializing in health-care and produces one-third of Spain’s scientific publications in biomedicine. It also hosts top international companies like Pfizer, Bristol Myers Squibb, Merck Serono, Novartis, Abbott Laboratories, Roche amongst others. In March 2017, Medlumics raised \$37 million in a Series B round. Furthermore, the Madrid region is #1 in the EU for the average life expectancy of 85.2 years.

Startup Genome Member(s): Madrid City Council, International Promotion Office

“Madrid’s startup ecosystem has had a growth spurt over the past 5 years in terms of VC activity (a 340% increase over the past 4 years), corporate innovation, and the sheer number of startups— we’re now 1200 startups strong.”

Juan Manuel Garrido
General Director for Innovation and City Promotion, Madrid City Council

Why you should invest in Madrid

-  Top 25 Global Ecosystem **Fintech**
-  Top 25 Global Ecosystem **Bang for Buck**

Software Startup Output **900-1,200**
Global Avg: 1,010

Ecosystem Value **\$3.6 bn**
Global Median: \$5 bn

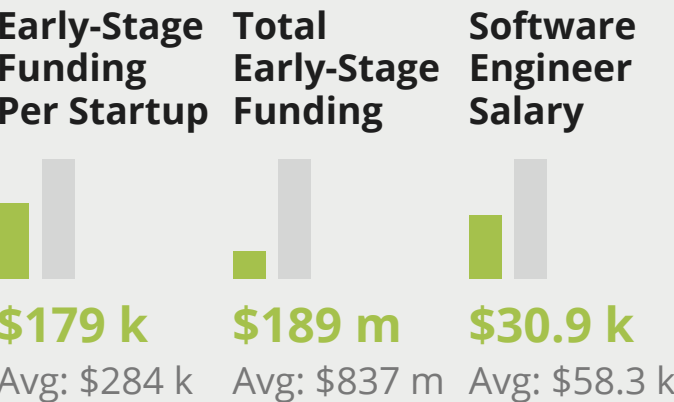


Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Madrid

Incentives for Business Angels: A deduction of 30% on investment income tax (IRPF) up to \$70,800 and a tax deduction of 42% in R&D&I projects.

Public procurement program: Madrid City is leading municipal investment in public procurement of innovation (\$11.8 million forecast in 2019) and fosters the creation of a local innovation market, aggregating public/private demand via Madrid Mobility Movement (M3)



Melbourne Australia

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: **Edtech**

Edtech is the fastest growing sub-sector in Melbourne. More than 10% of startups are targeting the education sector. The University of Melbourne is a leader in educational research and was ranked #6 globally by QS World University Rankings in education in 2018. The state of Victoria has a large proportion of high-growth companies in Edtech, with 15% of scale-ups operating in the sub-sector. Study Loans received a \$55 million cash injection in June 2018.

Sub-Sector Strength: **Life Sciences**

In 2015, Spinifex Pharma was acquired by Novartis for \$200 million, plus a potential \$500 million in milestone payments. Telix Pharmaceuticals, a clinical-stage biopharmaceutical company, went public in 2017 at a valuation of \$98 million. Successes like these highlight the role of the BioMelbourne Network in fostering the Life Sciences sector, as well as the national Biomedical Translation Fund (BTF). In 2017, BTF awarded a \$5.7 million grant to SummatiX, a medical informatics startup.

Startup Genome Member(s): LaunchVic

"The Melbourne startup scene is flourishing through the convergence of ICT talent, growth in the number of startups, our commitment to inclusion, and the fact that we are one of the most liveable cities globally."

Kate Cornick
CEO at LaunchVic

Why you should invest in Melbourne

 Top 20 Global Ecosystems
Connectedness

 Top 25 Global Ecosystems
Talent

Software Startup Output **1k-1.4k**
Global Avg: 1,010

Ecosystem Value **\$2.2 bn**
Global Median: \$5 bn

3
Exit Growth Index

7
Output Growth Index

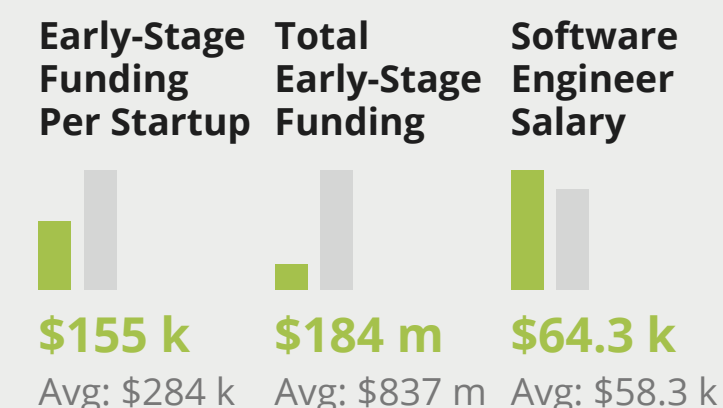
6
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Melbourne

Strong tech presence: Startups have access to corporate customers such as Alibaba, Google, Amazon which have all opened local offices. These have been joined by Fintech company Airwallex, which achieved unicorn status in 2019.

Inclusion: Over 20% of founders are born overseas, and 2% of founders are from indigenous peoples—who are 1% of the total population.



Montréal Canada

Ecosystem Phase: **Early-Globalization**



Sub-Sector Strength: **Adv. Manufacturing & Robotics**

Greater Montréal is the #3 ecosystem for aerospace after Seattle and Toulouse, and it has the second-largest density of aerospace jobs in the world. Centech, a high-tech incubator, offers funding, a 12-week manufacturing 4.0 cohort, and a workshop. Local startups include Kinova, which raised \$25 million, Mnubo who recently raised \$16.5 million and Vention, which raised \$17 million.



Sub-Sector Strength: **AI, Big Data, & Analytics**

McGill University and Université de Montréal have 250 AI researchers and doctoral students and approximately \$117 million in combined AI grants. Recently, Real Ventures launched an AI accelerator and Creative Destruction Lab did the same in partnership with HEC-Montréal. Google, Microsoft, Facebook, and the Royal Bank of Canada have invested millions in local AI labs. In 2017, Element AI announced a \$102 million funding round.

Startup Genome Member(s): Bonjour Startup Montréal, Centech, Real Ventures, Ville de Montréal, Montreal Inc.

“Montréal is a good place to launch a startup with funding and talent. The city offers one of the best lifestyles with low rent, a blooming cultural scene, and the third best transportation system in North America.”

Simon Décary

Economic Development Commissioner, Digital Sector and Startups, City of Montréal

Why you should invest in Montréal



Top 20 Global Ecosystem

Artificial Intelligence



Top 25 Global Ecosystem

Adv. Manufacturing & Robotics

Software Startup Output

1k-1.4k

Global Avg: 1,010

Ecosystem Value

\$3.4 bn

Global Median: \$5 bn

5

Exit Growth Index

9

Output Growth Index

10

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Montréal

Leveraging R&D spending: Thanks to a variety of credits, research-intensive startups can leverage their R&D spending by five or six times. Nationally, there is a 40% tax credit on R&D expenses. Tax credits are also available for university research and private partnership pre-competitive research, and fees and dues paid to a research consortium.

Early-Stage Funding Per Startup



\$374 k

Avg: \$284 k

Total Early-Stage Funding



\$447 m

Avg: \$837 m

Software Engineer Salary



\$49.4 k

Avg: \$58.3 k



Rhineland Germany

Ecosystem Phase: **Early-Globalization**

Rhineland encompasses the cities of Aachen, Bonn, Cologne, and Düsseldorf.



Sub-Sector Strength: **Adv. Manufacturing & Robotics**

Industrial IoT developer Cumulocity was acquired by Software AG in 2017. Silexica, an industry software company, raised \$18 million in a Series B round in 2018. An electric car factory was opened by e.go, one of the numerous spin offs from the Laboratory for Machine Tools and Production Engineering (WZL) of RWTH Aachen University, which focuses on research and innovation in production engineering.



Sub-Sector Strength: **B2B Enterprise Solutions**

Most startups in Rhineland are targeting B2B Customers. Rhineland is home to many multinational corporations, such as Deutsche Telekom, Henkel, Metro, Bayer, Deutsche Post DHL Group. Success stories include LeanIX, offering a SaaS for enterprise architecture, which raised \$30 million in a Series C round in 2018. Instana, founded in Rhineland, raised a \$30 million Series C round in 2018.

Startup Genome Member(s): Digihub Düsseldorf/Rheinland, Digital Hub Cologne, Digital Hub Bonn, digitalHUB Aachen

“Rhineland’s startup community has significantly evolved in the last 4 or 5 years. It feels like a true ecosystem with more people, better knowledge, stronger connections, and a focus on modernizing traditional German industries.”

Dr. Lorenz Gräf

Founder at STARTPLATZ

Why you should invest in Rhineland



Top 20 Global Ecosystem

Knowledge



Top 30 Global Ecosystem

Affordable Talent

Software Startup Output **750-1,050**
Global Avg: 1,010

Ecosystem Value **\$1.4 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

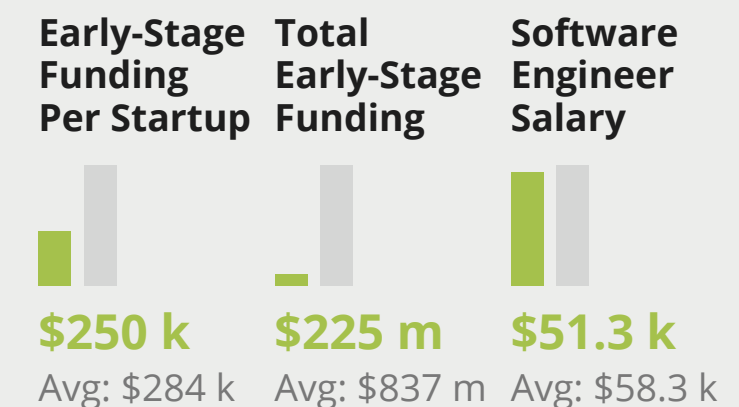
Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Rhineland

Capital: High-Tech-Gründerfonds, the largest seed fund in Germany, has invested around \$1.1 billion since 2005 while Trivago’s IPO has helped draw attention from overseas.

B2B customer density: 20 percent of the DAX listed companies are headquartered in Rhineland.

Research institutions: 10 of the 57 German clusters of excellence are located at the regional universities.



Seoul South Korea

Ecosystem Phase: **Early-Globalization**

Sub-Sector Strength: **Adtech**

South Korea's advertising market is the 7th largest in the world with a total domestic advertising market at \$12.5 billion in 2018. South Korea is home to several advertising giants including Cheil Worldwide, which was the 19th largest advertising agency in the world by revenues in 2018. In January 2019, Madup, a creative performance marketing agency, raised \$12 million in Series B funding. In April 2018, Dable, a B2B omnichannel personalization platform, raised a \$5.6 million Series B round.

Sub-Sector Strength: **Gaming**

With approximately \$5.6 billion in revenues, South Korea's gaming industry is the 4th largest in the world. The South Korean gaming market has 28.9 million players with around 39% watching gaming content online. In 2018, Bluehole, a fantasy game developer for PC and mobile devices, raised \$500 million from Tencent Holding and became a unicorn. In 2017, Netmarble, South Korea's largest mobile game developer, raised \$2.3 billion in the country's second largest IPO.

Startup Genome Member(s): Seoul Metropolitan Government

"Seoul has been the center of talented young workforce with creativity and competence in South Korea. We [Seoul Metropolitan Government] will create a fast track for them to realize their dreams here, with public investment, spaces, and programs."

Park Won-soon

Mayor of Seoul

Why you should invest in Seoul

 Top 10 Global Ecosystem
Gaming

 Top 20 Global Ecosystem
Talent

Software Startup Output **600-1,000**
Global Avg: 1,010

Ecosystem Value **\$5 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



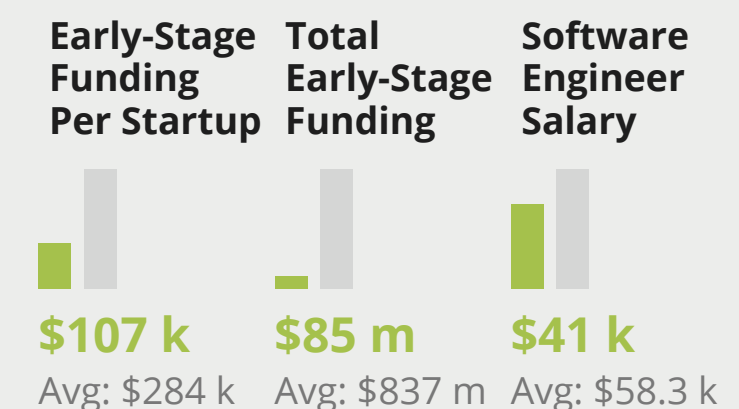
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Seoul

Creative Economy Policy: South Korea has invested around \$2 billion annually into the country's startup ecosystem since 2013. Under the policy, K-Startup Grand Challenge is held where foreign startups collaborate with local VCs and companies.

R&D: South Korea is the fifth highest investor in R&D with around \$70 billion. South Korea's R&D spending to GDP ratio is highest in the world at 4.55 percent.



Tokyo Japan

Ecosystem Phase: **Early-Globalization**



Sub-Sector Strength: **Adv. Manufacturing & Robotics**

Japan is the world's predominant industrial robot manufacturer and produces more than half of the global supply. Japan Robot Association, the world's first trade association for robots was formed in Tokyo in 1971 with members such as Denso, Hitachi, Sony, Toshiba, Yamaha Motors, Kawasaki Heavy Industries, Mitsubishi Electric, etc. ispace technologies, a space resource exploration company which uses micro-robots, raised \$90 million in a Series A round.



Sub-Sector Strength: **Fintech**

Tokyo is ranked the fifth most competitive financial center in the world according to the Global Financial Centers Index and is home to biggest banks in Japan including Mitsubishi UFJ Financial Group, Sumitomo Mitsui Financial Group, and Mizuho Financial Group. The Tokyo Metropolitan Government has put together a "Global Financial City: Tokyo" Vision and launched FinTech Business Camp Tokyo, a Fintech-focused government accelerator program. In 2018, Folio, a brokerage platform, raised \$79 million in a Series A round.

Startup Genome Member(s): Tokyo Metropolitan Government

"With its sophisticated technologies, highly skilled talent, universities and research institutes, and the vibrant dynamism which generates new cultural trends, Tokyo allows you to realize your ideas in the best of forms."

Takahiro Matsushita

Director General, Office for Strategic Policy and ICT Promotion, Tokyo Metropolitan Government

Why you should invest in Tokyo



Top 10 Global Ecosystem
Knowledge



Top 20 Global Ecosystem
Adv. Manufacturing & Robotics

Software Startup Output **800-1,200**
Global Avg: 1,010

Ecosystem Value **\$14 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Tokyo

Business Camp Tokyo: An accelerator programme for innovative non-Japanese startups (Industry 4.0 & Fintech) to accelerate their business expansion into Japan's market via Tokyo.

J-Startup Program: Launched by the Ministry of Economy, Trade and Industry to incubate startups with resources from large companies, venture capital firms, and accelerators. The program also allows startups to participate in government procurement programs.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$336 k	\$282 m	\$55.5 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Ecosystem Deep Dives

Late-Globalization Phase

126	Jakarta, ID	131	Sydney, AU
127	Miami, US	132	Toronto-Waterloo, CA
128	Paris, FR	133	Vancouver, CA
129	San Diego, US	134	Washington, D.C., US
130	São Paulo, BR		

Late-Globalization Phase Ecosystems

Key Objective for Late-Globalization Phase Ecosystems

1. Global Market Reach: Top 5 Ecosystems

- Vancouver
- Miami
- Toronto-Waterloo
- Paris
- San Diego

2. Early-Stage Funding per Startup: Top 5 ecosystems

Ecosystem	Early Stage Funding per Startup (\$)
San Diego	\$537 k
Paris	\$527 k
Toronto-Waterloo	\$319 k
Sydney	\$258 k
Vancouver	\$235 k



Jakarta Indonesia

Ecosystem Phase: **Late-Globalization**

With the ambition to become “The Digital Energy of Asia,” the Indonesian government is pursuing efforts to support e-commerce and digital services. Indonesia has strong internet and mobile adoption with approximately 75 percent of online purchases made via mobile phones. Jakarta is home to four recent unicorns: Tokopedia, Go-Jek, Traveloka, and Bukalapak, the biggest number compared to other ASEAN ecosystems.

Sub-Sector Strength: **Fintech**

In 2018, Indonesia’s central bank, Bank Indonesia introduced a regulatory Fintech ‘sandbox’ to test innovative startups while the Financial Services Authority launched OJK Infinity to build the Fintech ecosystem as a part of the national financial system. In addition, a Fintech Office was established, through Bank Indonesia, by the Indonesian government to facilitate discussions and assess the benefits, risks, and potential of fintech startups. Moka, a startup building mobile point-of-sale for SMEs, raised \$33 million in a Series B round in September 2018, and Akulaku, a financial services provider, raised \$100 million in a Series D round in 2019.

Startup Genome Member(s): MIKTI (Indonesia Digital Creative Industry Society)

“Greater Jakarta functions as headquarters for all national and many regional large industries, corporations and government offices. There’s a high internet and mobile penetration and a growing number of middle-income citizens. It’s a great setup for startups.”

M. Andy Zaky

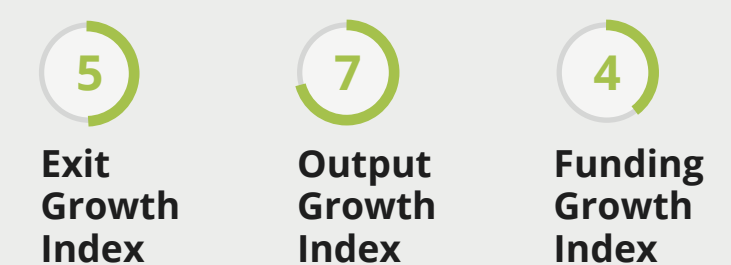
Secretary General of MIKTI (Indonesia Digital Creative Industry Society)

Why you should invest in Jakarta

 Top 10 Global Ecosystem
Bang for Buck

Software Startup Output **800-1100**
Global Avg: 1,010

Ecosystem Value **\$12 bn**
Global Median: \$5 bn

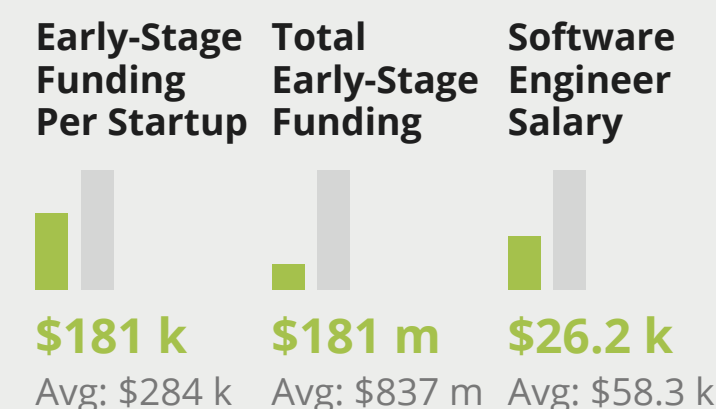


Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Jakarta

Relaxed regulations for IPOs: Indonesia’s stock exchange announced plans to loosen rules and launch a technology section in 2019 to include initial public offerings by startups.

Developing infrastructure: Presence of a large number of incubators and accelerators including Google-backed Digitalaya, the international Plug & Play Accelerator, and the GNB Accelerator, and some prominent VCs including East Venture, MDI, Mandiri Capital, and GDP Venture.



Top 30 Global Ecosystem

Miami United States

Ecosystem Phase: **Late-Globalization**

Miami is becoming a tech powerhouse, with tech jobs growing 40% between 2012 and 2018. South Florida's unicorns include ParkJockey, Mako Surgical, Magic Leap, and Chewy. The Miami metro ranked 13th overall in the Surge Cities analysis published by Inc. magazine and Startup Genome.

Sub-Sector Strength: **Edtech**

Hero K12, based near Miami, builds student behavior applications and received \$150 million in 2017. Nearpod, a mobile app that enables teachers to create and share interactive multimedia presentations with their students, raised \$21 million in Series B funding in 2017.

Sub-Sector Strength: **Life Sciences**

Startupbootcamp's first U.S. program was set up to support Miami health care startups with a \$2 million grant from the Knight Foundation. The Cambridge Innovation Center houses 250 early and mid-stage companies and a wet lab for early-stage Biotech startups. Biscayne Neurotherapeutics, a clinical-stage biotechnology company, was acquired for \$185 million in 2018.

Startup Genome Member(s): Knight Foundation

"Miami's transformation over the last decade goes beyond the built environment: It's a story about people — those who are choosing to build their lives here and the kinds of endeavors they are pursuing."

Raul Moas

Miami Program Director at Knight Foundation

Why you should invest in Miami

 #5 Global Ecosystem

 **Market Reach**

 Top 30 Global Ecosystem

 **Life Sciences**

Software Startup Output **1.2k-1.7k**
Global Avg: 1,010

Ecosystem Value **\$13 bn**
Global Median: \$5 bn

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Exit Growth Index

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Output Growth Index

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Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Miami

Global community: Startups can tap into one of the most diverse talent pools in North America. Miami is the #1 metropolitan area in the U.S. in Latino entrepreneurship and has one of the highest percentages of immigrant-owned businesses. This diversity also allows companies to test ideas across a wide range of potential customers.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$178 k	\$300 m	\$81.3 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

#9 Global Ecosystem

Paris France

Ecosystem Phase: **Late-Globalization**

Sub-Sector Strength: **Edtech**

The Edtech startup ecosystem in Paris is supported by the presence of two Edtech VC funds, Educapital and Brighteye Ventures. In addition, initiatives and industry bodies like EdTech Observatory and EdTech France have been set up to promote the Edtech industry in France. Startup success stories include OpenClassrooms, which raised \$60 million in a Series B round in 2018.

Sub-Sector Strength: **Fintech**

Financial Services is the largest business sector in Paris, and it includes six Fortune 500 companies with combined revenue above \$500 billion. Paris is also home to Paris Fintech Forum, which in its latest edition hosted more than 220 CEOs and 2,600 participants from more than 60 countries. Startups in the space include Qonto, a Fintech startup, which raised \$23 million in a Series B round in 2018, and French mobile payment startup Lydia, which raised \$16 million in 2018 in a venture round.

"France has taken over Europe as the place where the most funding rounds happened in 2018. The next step is to turn our eurocentric scale-ups into global leaders."

Nicolas Brien

CEO at France Digitale

Why you should invest in Paris

Top 10 Global Ecosystem
Fintech

Top 10 Global Ecosystem
Connectedness

Software Startup Output **2.3k-3.2k**
Global Avg: 1,010

Ecosystem Value **\$19 bn**
Global Median: \$5 bn

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Exit Growth Index

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Output Growth Index

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Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Paris

Strong R&D focus: Paris has 162,000 R&D workers with a total expenditure of \$22.5 billion in R&D.

Talent attraction: The Passport Talent initiative, launched in 2016, includes the French Tech visa. And, French Tech Ticket offers a small amount of funding and acceleration and incubation services for a year — plus a fast-track residence permit.

Early-Stage Funding Per Startup



\$527 k

Avg: \$284 k

Total Early-Stage Funding



\$1.6 bn

Avg: \$837 m

Software Engineer Salary



\$50.1 k

Avg: \$58.7 k

#20 Global Ecosystem

San Diego United States

Ecosystem Phase: **Late-Globalization**



Sub-Sector Strength: **Life Sciences**

At 11.2 percent, San Diego has the highest percentage of Life Sciences startups of any ecosystem we studied (almost 4x the global average). Local unicorns include Samumed, which raised \$438 million in 2018 with a \$12 billion valuation and Impact Biomedicines, which was acquired by Celgene in 2018 in a deal valued at up to \$7 billion. Several other biotech companies--Gossamer Bio, Crinetics, ChaSerg Technology--have raised hundreds of millions of dollars or filed to go public recently.

San Diego is also home to around 37 research organizations in Life Sciences, including the Scripps Research Institute and Sanford Burnham Prebys Medical Discovery Institute. Major pharmaceutical companies including Eli Lilly, Pfizer, GlaxoSmithKline, and Takeda have a presence in San Diego to collaborate with research institutes, universities, and small biotechnology companies. Local universities contribute 10 feeder degree programs and UC San Diego is a leading Life Sciences school.

Why you should invest in San Diego



#3 Global Ecosystem
Life Sciences

Software Startup Output **1k-1.4k**
Global Avg: 1,010

Ecosystem Value **\$8.2 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



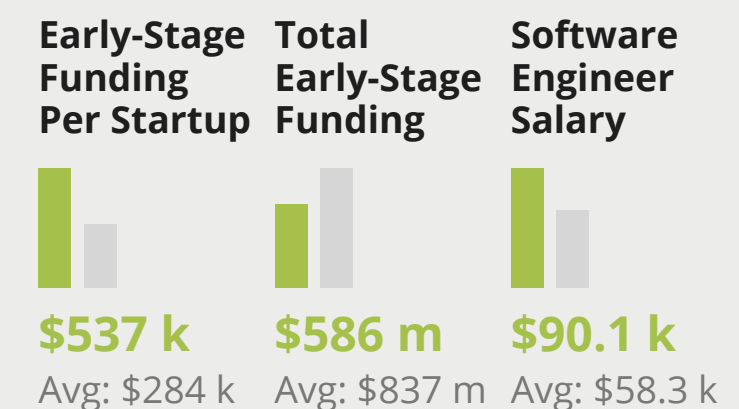
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to San Diego

Partial Sales Tax Exemption: Offers businesses a 4.19% state sales tax exemption to reduce the tax on manufacturing and research & development equipment purchases.

Access to talent: Entrepreneurs can draw talent from the UC San Diego campus and surrounding military bases, as well as the offices of industry majors, including pharmaceutical giant GlaxoSmithKline and defense contractor Northrop Grumman.



São Paulo Brazil

Ecosystem Phase: **Late-Globalization**

Sub-Sector Strength: **Fintech**

São Paulo is the financial center of Brazil, hosting approximately one-third of the country's banks and accounting for one-third of credit transactions. It is also home to one of the five largest stock exchanges in the world, BM&FBovespa. Brazil's Fintech market is projected to generate potential revenue up to \$24 billion over the next 10 years. Nubank, a digital bank and credit card operator, raised \$150 million and became a unicorn in March 2018. StoneCo Ltd, a credit card processing firm, raised \$1.1 billion in an IPO in October 2018.

Sub-Sector Strength: **Life Sciences**

Brazil is the largest healthcare market in Latin America and the world's seventh-largest health market with more than \$42 billion spent annually on private healthcare. The city also hosts Hospitalar, one of the largest Healthcare trade shows in the world attended by more than 85,000 professionals from more than 50 countries. Memed, a provider of an online platform for e-prescription service, raised a \$3 million Series A round in a deal led by Redpoint eventures.

Startup Genome Member(s): ABStartups, CUBO Itau

"São Paulo has everything that a vibrant startup ecosystem need, highly skilled workforce, diversity of its industries, public and private partners deeply engaged to create a global leader community."

Amure Pinho

President at Brazilian Association of Startups

Why you should invest in São Paulo

 Top 10 Global Ecosystem
Affordable Talent

 Top 30 Global Ecosystem
Fintech

Software Startup Output **1.3k-1.7k**
Global Avg: 1,010

Ecosystem Value **\$5.1 bn**
Global Median: \$5 bn

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Exit Growth Index

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Output Growth Index

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Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to São Paulo

Reduced tax burden: The federal government offers a variety of exemptions across income, import, and export taxes, as well as on manufactured products.

High-quality universities: Sao Paulo is home to several leading science and technology universities, including University of São Paulo (USP), which was the #1 South American university in the 2019 World University Rankings.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$82 k	\$120 m	\$25.9 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Sydney Australia

Ecosystem Phase: **Late-Globalization**

Sydney's success stories include Canva, a graphic design startup, which has become Australia's latest tech unicorn after closing a funding round of \$40 million, valuing its operations at \$1 billion. Deputy, an employee management tool, raised \$81 million in the largest Series B in Australian history.

Sub-Sector Strength: **Fintech**

Sydney's financial industry accounts for 9% of national GDP, larger than Hong Kong and Singapore. Brighte, an interest-free home improvement platform, raised \$29 million in Series B venture funding in 2018. Lendi, a home loan matching platform, raised \$40 million from ANZ in 2019.

Sub-Sector Strength: **Edtech**

The region's many universities draw tens of thousands of international students, providing a good testing ground for Edtech startups. Sydney-based Smart Sparrow, an online learning design platform, raised \$11.5 million in Series C funding in 2018. OpenLearning, a social-learning platform, raised \$6.4 million of venture funding in 2018.

Startup Genome Member(s): University of Technology Sydney and in partnership with StartupAUS

"At the University of Technology Sydney, we see technology and entrepreneurship as Australia's future. We're fostering the next generation of entrepreneurs who will transform our economy and secure our global position."

Professor Margaret Maile Petty

Executive Director, Innovation and Entrepreneurship, University of Technology Sydney

Why you should invest in Sydney

 Top 10 Global Ecosystem
Connectedness

 Top 15 Global Ecosystem
Fintech

Software Startup Output **1.5k-2.1k**
Global Avg: 1,010

Ecosystem Value **\$6.7 bn**
Global Median: \$5 bn

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Exit Growth Index

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Output Growth Index

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Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Sydney

Get plugged in: Founders can immediately get connected through several different networks such as Hive Mind and North Sydney Innovation Network's roundtables.

Support infrastructure: Sydney Startup Hub has incubators, accelerators, and coworking spaces. It is complemented by the Building Partnerships grants, which assist revenue-generating startups scale through acquisitions.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$258 k	\$530 m	\$62.4 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Toronto-Waterloo Canada

Ecosystem Phase: **Late-Globalization**

Sub-Sector Strength: **AI, Big Data, & Analytics**

Ontario has allocated \$350 million to focus on its development of AI, 5G, autonomous vehicles, and other technologies. Corporations such as Google and Uber have set up AI R&D centres. CIFAR, the Vector Institute, and Waterloo.ai drive local AI investment. Rubikloud offers AI for enterprise retailers and raised \$37 million in 2018. Integrate.ai, an applied AI enterprise software firm, raised \$30 million in 2018.

Sub-Sector Strength: **Life Sciences**

Ontario ranks #7 in Life Sciences employment in North America. Toronto's Life Sciences sector employs about 30,000 professionals and contributes around \$2 billion to the local economy. The MaRS Discovery District supports commercialization with local hospitals and is home to the JLABS incubator with 45 early-stage Life Sciences companies. League Inc., a health platform, raised \$47 million in 2018.

Startup Genome Member(s): Communitech, MaRS

"To meet Toronto's talent demands, we've created an ecosystem-wide peer support network for founders and teams, where people are trained to help each other develop, retain, and attract diverse talent."

Ben Baldwin

Founder, The Founder City Project

Why you should invest in Toronto-Waterloo

 Top 20 Global Ecosystem
Life Sciences

 Top 20 Global Ecosystem
Artificial Intelligence

Software Startup Output **2.2k-2.9k**
Global Avg: 1,010

Ecosystem Value **\$17 bn**
Global Median: \$5 bn

5
Exit Growth Index

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Output Growth Index

5
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Toronto-Waterloo

Density of corporations and talent:

The Toronto-Waterloo corridor is the second largest technology cluster in North America with roughly 15,000 companies and 200,000 tech workers. Access to funding: The \$1.26 billion Strategic Innovation Fund makes investments and the Ontario Network of Entrepreneurs supports about 130 nonprofits.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$319 k	\$850 m	\$56.5 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Vancouver Canada

Ecosystem Phase: **Late-Globalization**

Sub-Sector Strength: **Cleantech**

The Canadian government has announced a \$700 million investment in the country's Cleantech industry. Vancouver is home to 25% of all Cleantech companies in Canada, with more than 220 Cleantech companies employing approximately 3,500 people. Recently, six companies based in the Vancouver ecosystem were named to the 2019 Global Cleantech 100. General Fusion, a developer of utility-scale fusion power, has secured \$127 million in funding to date.

Sub-Sector Strength: **Blockchain**

The world's first Bitcoin ATM was built and commercially operational in Vancouver. Some of the earliest blockchain projects in Fintech and the energy sector were conducted by BTL, headquartered here. Dapper Labs, a blockchain-based experience startup, raised \$15 million in Series A funding led by Venrock and Alphabet in 2018. Dapper Labs is the parent company of CryptoKitties which raised \$12 million in 2018.

Startup Genome Member(s): Vancouver Economic Commission

"Vancouver has a diverse range of tech sector strengths where startups thrive, including Cleantech, Fintech, Life Sciences, AI, VR/AR and Digital Entertainment."

Shivam Kishore

Manager, Tech Sector Growth at the Vancouver Economic Commission

Why you should invest in Vancouver

 Top 10 Global Ecosystem
Blockchain

 Top 20 Global Ecosystem
Cleantech

Software Startup Output **900-1,200**
Global Avg: 1,010

Ecosystem Value **\$10 bn**
Global Median: \$5 bn

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Exit Growth Index

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Output Growth Index

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Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Vancouver

Tax credits: Startups focused on deep tech sectors and research-intensive areas can obtain a credit of up to 45% of R&D expenses.

BC Tech Fund: The provincial government recently announced a new \$100 million venture fund, focused on companies seeking Series A financing.

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$235 k	\$237 m	\$55.2 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

Washington, D.C. United States

Ecosystem Phase: **Late-Globalization**

Sub-Sector Strength: **Cybersecurity**

As a share of its total, the region has 2.5x more Cybersecurity startups than the global average, and these companies can draw on a regional population of cyber-related engineers three times larger than the rest of the country combined. Tenable Network Security IPO'd in 2018 with a valuation of \$2.1 billion. Washington, D.C.-based Lavrock Ventures, announced a \$25 million fund to invest in enterprise software, cybersecurity and national security early-stage startups.

Sub-Sector Strength: **Edtech**

Numerous government agencies and influencers play a role in Washington, D.C.'s Edtech ecosystem including the Office of Education Technology at the U.S. Department of Education. The regional Edtech ecosystem is supported by Novak Biddle Venture Partners, a supporter of Edtech ventures with investments in 2U, Inc., Capital Education Group, Inc., and Parchment. EverFi, an online course provider has raised \$251 million in total funding.

"Startups in Washington, D.C., have a refreshing focus on taking on significant global challenges and bringing their unique entrepreneurship lens to problems historically left to governments."

Donna Harris
Cofounder, 1776
General Partner, 1776 Ventures

Why you should invest in Washington, D.C.

- #3 Global Ecosystem **Cybersecurity**
- Top 10 Global Ecosystem **EdTech**

Software Startup Output **2.2k-3k**
Global Avg: 1,010

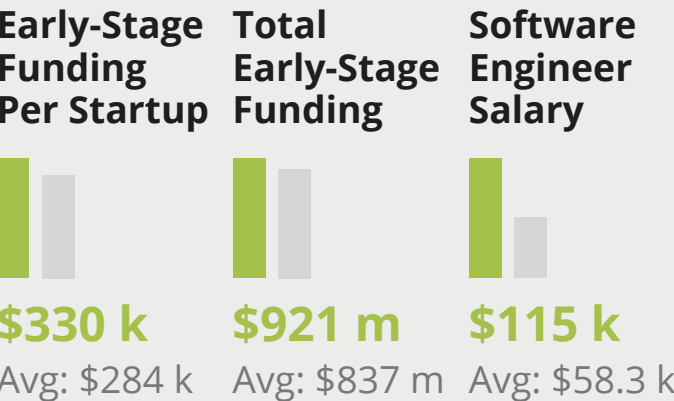
Ecosystem Value **\$12 bn**
Global Median: \$5 bn



Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Washington, D.C.

Proximity to government: It's no accident that the nation's capital has developed a thriving tech ecosystem. Startups have access to funding, contracts, customers, and experienced talent. The region is home to four of the top five 2018 research funders in Life Sciences. In-Q-Tel is a nonprofit investor that accelerates the development and delivery of technology to the American intelligence community. The city's Inclusive Innovation Incubator is a public, private, and academic partnership which involves the D.C. Office of the Mayor.



Ecosystem Deep Dives

Attraction Phase

- 137 Amsterdam-StartupDelta, NL
- 138 Austin, US
- 139 Bangalore, IN
- 140 Beijing, CN
- 141 Berlin, DE
- 142 Chicago, US

- 143 Los Angeles, US
- 144 Seattle, US
- 145 Shanghai, CN
- 146 Singapore, SG
- 147 Stockholm, SE
- 148 Tel Aviv, IL

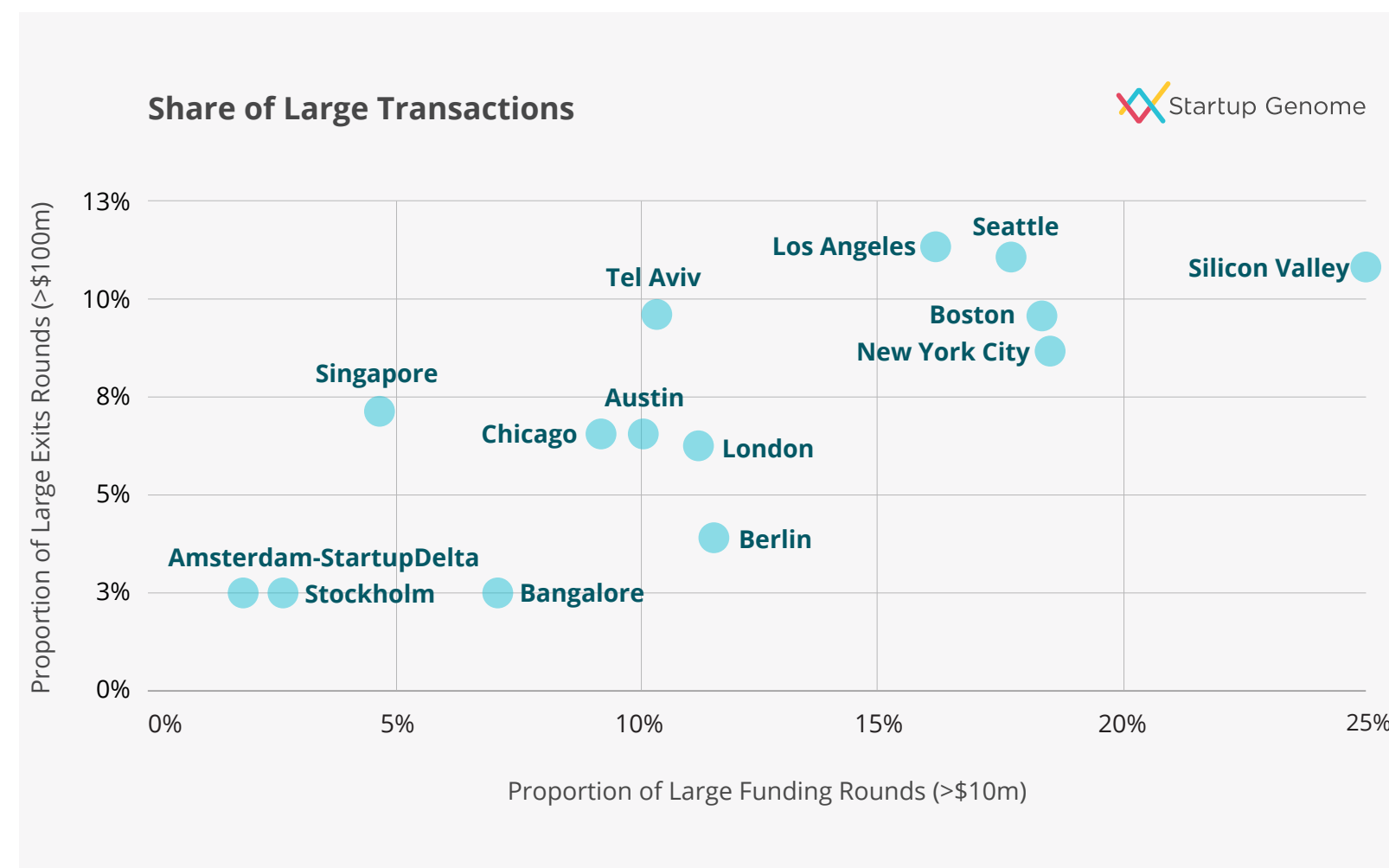
Integration Phase

- 149 Boston, US
- 150 London, UK
- 151 New York City, US
- 152 Silicon Valley, US

Attraction and Integration Phase Ecosystems

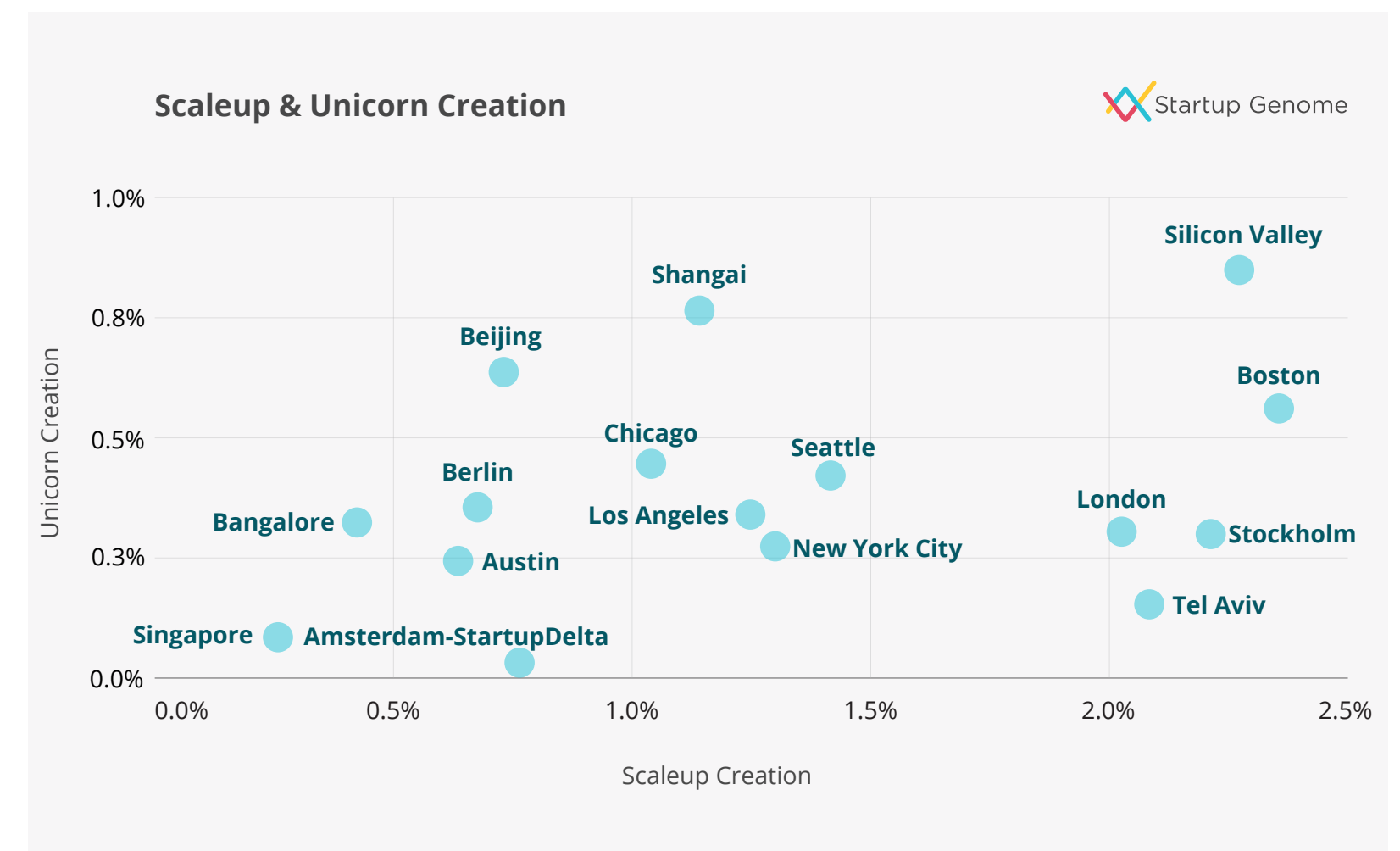
Share of Large Transactions

U.S. ecosystems lead in the proportion of large funding rounds and proportion of large exit rounds with Tel Aviv joining to complete the top quadrant.



Scaleup & Unicorn Creation

Silicon Valley dominates all the tech startup ecosystems with much higher scaleup and unicorn creation rate.



Unicorn Creation: \$B exit or \$B valuation round

Scaleup Creation: \$50M+ exit

Amsterdam-StartupDelta

Ecosystem Phase: **Attraction**

Netherlands

Amsterdam-StartupDelta is a region with over 10 tech clusters. Dutch successes include Adyen, a payment solutions startup now valued at nearly \$23 billion and Elastic, which raised \$252 million in an IPO and is currently valued around \$6.7 billion.

Sub-Sector Strength: **Agtech & New Food**

The Vegetarian Butcher, a meat substitute startup with 2,600 sales outlets in 13 countries, was acquired by Unilever in 2018. Wageningen University & Research was #1 worldwide in agriculture and forestry in 2017. Picnic, the online grocery platform, raised a \$109 million series B round in 2017.

Sub-Sector Strength: **Life Sciences**

Prexton Therapeutics was acquired by Lundbeck for over \$1.1 billion. The European Medicines Agency, a leading regulatory agency, is moving its headquarters to Amsterdam in 2019. Acerta Pharma was acquired for \$4 billion in 2016.

Startup Genome Member(s): Ministry of Economic Affairs and Climate Policy, StartupDelta

"Amsterdam is a very open city with the most nationalities in one place in Europe. The combination of highly educated people and liveable wages results in an amazing work and life culture."

Nils Beers

Director at StartupDelta

Why you should invest in Amsterdam-StartupDelta

 #4 Global Ecosystem
Agtech & New Food

 Top 15 Global Ecosystem
Life Sciences

Software Startup Output **3k-4.1k**
Global Avg: 1,010

Ecosystem Value **\$16 bn**
Global Median: \$5 bn

10

Exit Growth Index

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Output Growth Index

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Funding Growth Index

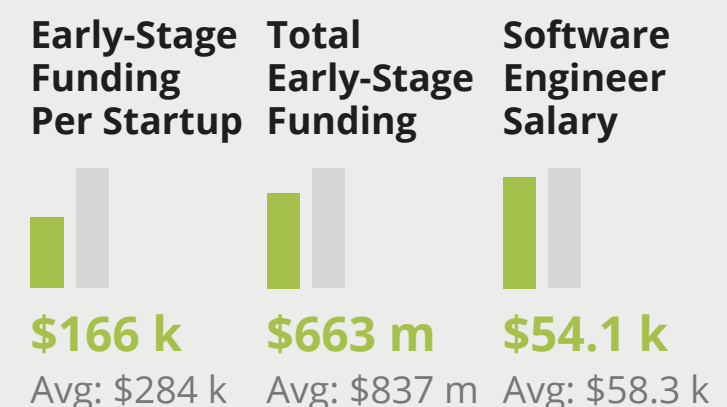
Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Amsterdam-StartupDelta

Welcoming international talent:

Highly skilled immigrants can qualify for the 30% tax ruling, international graduates get one year to find work or start a business post-graduation, and there are entrepreneur visas available.

Corporate connections: Startups can gain access to corporates across every sector. Nearly 200 multinationals have their European headquarters in Amsterdam, including Netflix, Uber, Tesla, and Salesforce.



Austin United States

Ecosystem Phase: **Attraction**



Sub-Sector Strength: **Cleantech**

Austin is home to the University of Texas’ Clean Energy Incubator, one of the longest-established energy and cleantech incubators in the United States. Austin is also home to successful companies like Energy Curb and Banyan Water. Local startups include Smarter Sorting, which is a data-driven technology that sorts hazardous household waste and raised \$9.3 million in 2018.



Sub-Sector Strength: **Cybersecurity**

SailPoint, an identity and access management provider, raised \$240 million in an IPO valuing the company at more than \$1 billion. ClearDATA, a managed cloud provider, raised \$26 million in 2018. Eagle Eye Networks, a cloud video surveillance provider, raised \$25 million in 2018. Austin was selected as the site for the new U.S. Army Futures Command, which will modernize the Army and invest in science, technology, and engineering.

“As the Austin startup ecosystem has matured, our work at Tech Ranch has evolved to connect this ecosystem’s future to the world, especially around the areas that have developed in Austin around impact innovation.”

Kevin Koym

CEO and Founder of Tech Ranch Austin

Why you should invest in Austin

Top 10 Global Ecosystem
Cybersecurity

Top 20 Global Ecosystem
Cleantech

Software Startup Output **1.8k-2.4k**
Global Avg: 1,010

Ecosystem Value **\$9.6 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

Reasons to move your startup to Austin

Growth Market: Austin is one of the fastest growing cities and offers start-ups a wide array of market opportunities and access to capital. In Surge Cities Index analysis, it ranked first in the U.S in population growth, third in its density of high-growth companies and sixth in its rate of job creation.

Early-Stage Funding Per Startup **\$383 k**
Avg: \$284 k



Total Early-Stage Funding **\$900 m**
Avg: \$837 m



Software Engineer Salary **\$81.5 k**
Avg: \$58.3 k



Indices calculated on a scale of 1 (lowest) to 10 (highest)



Learn more and get connected at startupgenome.com/ecosystems/austin

#18 Global Ecosystem

Bangalore India

Ecosystem Phase: **Attraction**

Sub-Sector Strength: **Edtech**

The education and training industry in India is expected to reach \$101 billion in size in FY19. Bangalore's unicorn list saw a recent addition from the Edtech ecosystem when Byju's, an online tutoring startup, raised \$540 million from Naspers in 2018, valuing the company at \$3.8 billion. Other startups in the space include Unacademy, India's largest free education initiative, which raised \$21 million in 2018 and Vedantu, which raised \$11 million in a Series B round in 2018, followed by a \$5 million in 2019

Sub-Sector Strength: **Fintech**

India's Fintech software market is expected to grow to \$2.4 billion by 2020. Bangalore is home to numerous Fintech startups such as Cleartax, an income tax filing platform, which raised \$50 million in Series B funding in a deal led by Composite Capital Management in 2018. Capital Float, an online platform that provides working capital finance to SMEs in India, raised \$22 million from Amazon in 2018.

"Bangalore has all of the ingredients to create a world class tech ecosystem - investors, engineers, clients, experts - and the potential to build high-quality global startups at a fraction of the cost."

Varun Chawla

Founder, 91springboard

Why you should invest in Bangalore

 #1 Global Ecosystem

 **Bang for Buck**

 Top 10 Global Ecosystem

 **Edtech**

Software Startup Output **1.8k - 2.5k**
Global Avg: 1,010

Ecosystem Value **\$24 bn**
Global Median: \$5 bn

10

Exit Growth Index

7

Output Growth Index

4

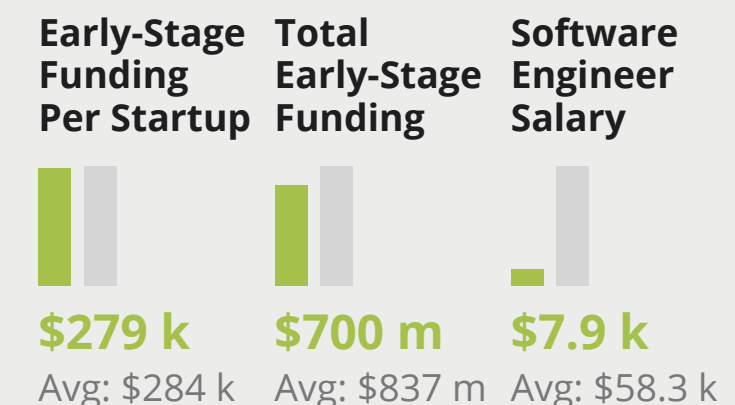
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Bangalore

IAC tax exemption: Startups are eligible for tax exemptions for three consecutive years out of the first seven of incorporation.

IT hub: India's Information Technology (IT) sector has seen rapid growth with the establishment and success of high tech firms in Bangalore. They employ roughly 35% of India's 2.5 million IT professionals



#3 Global Ecosystem

Beijing China

Ecosystem Phase: **Attraction**

Beijing is ranked #2 globally after Silicon Valley with respect to tech unicorns. Two out of the three most valued unicorns globally are from Beijing. As a top global ecosystem, Beijing ranks among the top three across most sub-sectors.

Sub-Sector Strength: **AI, Big Data, & Analytics**

Beijing is home to 1,070 AI companies, 26% of China's total. Beijing-based AI unicorn Bytedance closed \$3 billion of funding in 2018 at a valuation of \$75 billion — the world's largest privately backed startup. Zhongguancun, Beijing's tech hub, is home to 10 AI labs. China is building a \$2.1 billion AI technology park in Beijing's suburban Mentougou district.

Sub-Sector Strengths: **Fintech**

Beijing's financial sector accounted for 17% of the city's economic activity in 2017. The Beijing Fintech Demonstration Zone was announced in 2018. Tiger Brokers, an online brokerage, raised \$80 million in 2018, reaching unicorn status. Du Xiaoman Financial, Baidu's Fintech arm, raised \$1.9 billion in 2018, followed by a \$2.89 billion credit line from Bank of Tianjin.

"Beijing's greatest innovation asset lies in its preeminent education resources. Among Beijing's yearly 200,000 college graduates, many enter the startup scene one way or another, making this city a leading innovation highland as today."

Jordan Zhu

Senior Manager at Innoway in the Global Incubation Department

Why you should invest in Beijing

-  #2 Global Ecosystem
Artificial Intelligence
-  #4 Global Ecosystem
Fintech

Software Startup Output **7.5k-10k**
Global Avg: 1,010

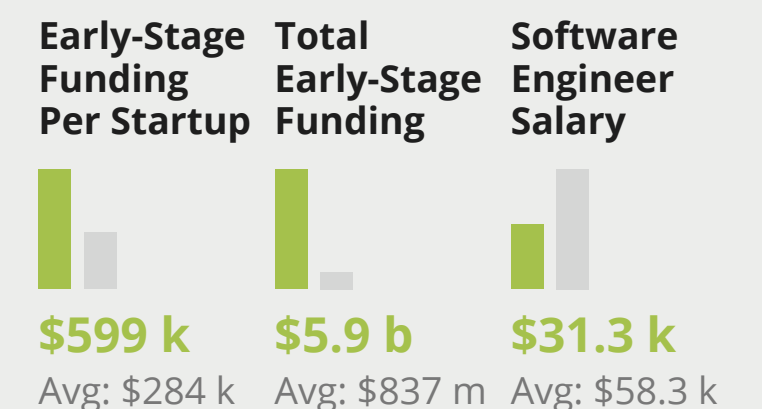
Ecosystem Value **\$142 bn**
Global Median: \$5 bn



Reasons to move your startup to Beijing

Beijing's tech hub Zhongguancun: Around 9,000 tech companies call this hub home, including Baidu, Sina Corp, and Lenovo.

Government support: The regional government aims to introduce \$2.2 billion in private capital to tech projects and committed to paying about \$14.9 million in loan interest for startups to reduce capital borrowing costs by 20%.



#10 Global Ecosystem

Berlin Germany

Ecosystem Phase: **Attraction**

Sub-Sector Strength: **Fintech**

Berlin's Fintech ecosystem is home to numerous startup support organizations such as FinLeap, a VC firm focusing on Fintech investments and operating one of the largest hubs for Fintech startups in Europe, H:32. Incumbents such as Deutsche Bank and Axel Springer run innovation labs and accelerator programs, but the most exciting part are the startups themselves. Fintech unicorn N26 raised \$300 million in Series D funding in January 2019 while Raisin, featured on the FinTech50 list of the top 50 Fintech startups across Europe in 2018, raised \$114 million in a Series D round in 2019.

Sub-Sector Strength: **AI, Big Data, & Analytics**

Berlin is home to more AI companies than any other German ecosystem and employs more than 5,000 people. AI companies in Berlin are expected to generate more than \$2.2 billion in revenue by 2025. The ecosystem has internationally renowned centers such as the German Research Center for Artificial Intelligence, the Berlin Center for Machine Learning, and the Berlin Big Data Center. In addition, the government has announced it will invest \$3.4 billion in developing the country's AI capabilities and research over the next six years. Startups in the space include Ada Health, an AI-driven healthcare app, which raised \$47 million in a Series A round in 2017.

"Berlin has organically grown into the European hub for IoT and Blockchain, where tech talent and industry giants jointly solve problems to drive technological and economic growth."

Nico Gramenz

CEO of Factory Berlin

Why you should invest in Berlin

 #3 Global Ecosystem

 **Market Reach**

 Top 15 Global Ecosystem

 **Fintech**

Software Startup Output **1.9k-2.6k**
Global Avg: 1,010

Ecosystem Value **\$23 bn**
Global Median: \$5 bn

9

Exit Growth Index

7

Output Growth Index

3

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Berlin

Incentivizing R&D: By 2025, Berlin aims to increase the ratio of R&D investment to 3.5% of GDP and invest \$17.4 billion in key research areas.

Attracting millennials: Berlin attracts entrepreneurs and talent from all over the world. Nestpick ranked Germany's capital as the best city in the world for millennials, based on factors like business ecosystem, essentials, openness, and recreation.

Early-Stage Funding Per Startup **Total Early-Stage Funding** **Software Engineer Salary**

\$565 k **\$1.4 bn** **\$65.1 k**
Avg: \$284 k Avg: \$837 m Avg: \$58.3 k

#17 Global Ecosystem

Chicago United States

Ecosystem Phase: **Attraction**

Sub-Sector Strength: **AI, Big Data, & Analytics**

Chicago is home to 14,000 technology companies employing roughly 340,000 people. In 2018, Tempus raised \$110 million in a Series E round, giving it a valuation of \$2 billion. Other startups to look out for include Uptake, an industrial AI and IoT platform, which raised \$117 million in Series D funding and Instana, a solution that monitors dynamic apps, which raised \$30 million from Accel and Meritech Capital Partners in 2018.

Sub-Sector Strength: **Fintech**

Chicago is the second-largest central business district in the United States and home to the Chicago Stock Exchange and nine Fortune 1000 financial services companies. The City's ChicagoNEXT program includes initiatives like the Blackstone Inclusive Entrepreneurship Challenge, ThinkChicago, and a new Fintech Committee. Success stories include Avant, an online lending platform which is valued close to \$2 billion. In 2017, Snapshot raised \$12 million from Tola Capital in Series D round.

"In bringing entrepreneurs from around the world to Chicago, we have found that this city has one of the most collaborative and diverse entrepreneurial communities in the world."

Peggy Parfenoff

President of WorldChicago

Why you should invest in Chicago

Top 20 Global Ecosystem
Artificial Intelligence

Top 15 Global Ecosystem
Fintech

Software Startup Output **2.1K-2.9k**
Global Avg: 1,010

Ecosystem Value **\$14 bn**
Global Median: \$5 bn

4

Exit Growth Index

5

Output Growth Index

3

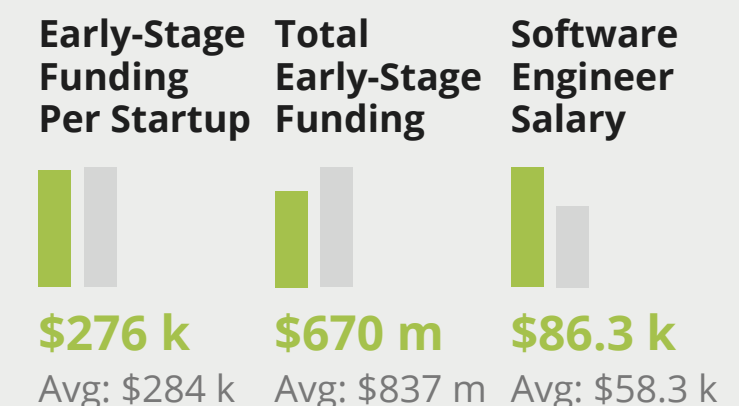
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Chicago

Women in startups: A third of the city's startups are founded and run by women. WiSTEM, a program at 1871 provides additional resources to women-owned startups in Chicago.

University programs: The Illinois Institute of Technology, Northwestern University, and the University of Chicago each operate startup incubators and offer programs in entrepreneurship and computer science.



#6 Global Ecosystem

Los Angeles United States

Ecosystem Phase: **Attraction**

Sub-Sector Strength: **Adtech**

Regional companies' ad spending stood at \$9.1 billion in 2018, representing 48% of California's total. Ad buying company The Trade Desk went public in 2016 with a valuation of \$1.1 billion. Centerfield, an Adtech and search engine marketing company, raised \$156 million in venture capital in 2017.

Sub-Sector Strength: **Gaming**

Major global gaming companies are headquartered in Los Angeles, including Riot Games, Activision Blizzard, and ESL Gaming (North America). In 2017, Respawn Entertainment, an independent video game development studio, was acquired by Electronic Arts for \$455 million. In 2019, mobile gaming company Jam City raised \$145 million.

Sub-Sector Strength: **Life Sciences**

Life Sciences companies from the Los Angeles ecosystem employ 122,000 people. The ecosystem also houses Amgen, the world's largest biotech company, and more than 10 Life Sciences-focused incubators. Radiology Partners, a healthcare service company, raised \$234 million in venture capital in 2018.

"We built a rock hard community, and seeing LA now, as one of the top startup cities in the world, is a testament to the power of community."

Cam Kashani

Cofounder and CEO at COACCEL: The Human Accelerator

Why you should invest in Los Angeles

 #3 Global Ecosystem

 **Adtech**

 #4 Global Ecosystem

 **Gaming**

Software Startup Output **3.9k-5.3k**
Global Avg: 1,010

Ecosystem Value **\$57 bn**
Global Median: \$5 bn



Exit Growth Index



Output Growth Index



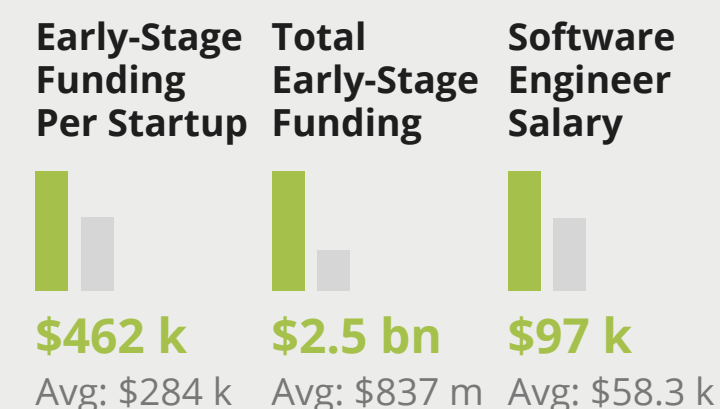
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Los Angeles

World-class universities: Southern California has 11 research universities including Caltech, UCLA, and USC. According to a 2017 Milken Institute study, 5 Southern California universities rank among the top 20 U.S. universities in terms of producing patents.

Pool of success: With recent successes such as Snap, Tinder, Bird, and Dollar Shave Club, the region offers a deep pool of experienced founders, employees, and investors.



Seattle United States

Ecosystem Phase: **Attraction**

Sub-Sector Strength: AI, Big Data, & Analytics

Google invested \$10.5 million in AI algorithm marketplace Algorithmia and Apple is expanding operations in its Seattle AI hub. Qumulo, an enterprise data storage startup, raised \$93 million in 2018. Deep learning startup, Vertex.AI was acquired by Intel for an undisclosed amount in 2018. The Allen Institute for Artificial Intelligence hired Yejin Choi, a University of Washington professor, to research AI under Project Alexandria — backed by \$125 million from late Microsoft co-founder Paul Allen.

Sub-Sector Strength: Life Sciences

The primary care and family medicine programs at the University of Washington have consistently topped the U.S. News & World Report rankings. Seattle is home to biotech companies like Corixa, Trubion, and ZymoGenetics and the headquarters of major investors including the Bill & Melinda Gates Foundation and PATH. Nohla Therapeutics, a hematologic malignancies therapy developer, raised \$56 million in 2018. Impel NeuroPharma, a medical device startup, raised \$67.5 million in 2018.

“Founders appreciate the dynamic world-class tech ecosystem Seattle offers. We’re generous leaders in AI, Cloud, IoT, Robotics, Big Data, Fintech, Biotech, VR/XR, and more for you to connect with.”

Brett Greene
CEO and Founder of New Tech Northwest

Why you should invest in Seattle

- Top 10 Global Ecosystem **Artificial Intelligence**
- Top 15 Global Ecosystem **Life Sciences**

Software Startup Output **1.8k-2.4k**
Global Avg: 1,010

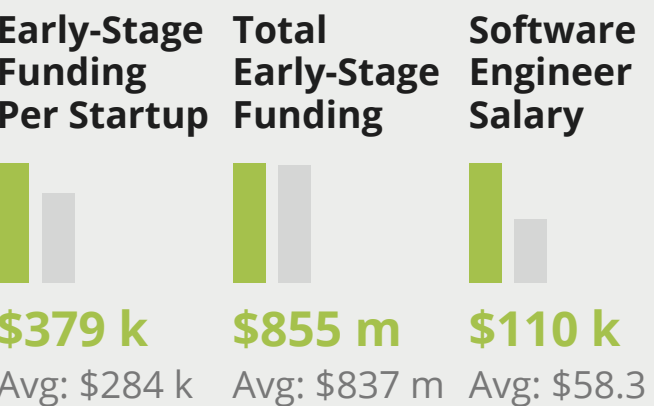
Ecosystem Value **\$24 bn**
Global Median: \$5 bn



Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Seattle

Startup genealogy: Founders can draw on extensive regional experience. Microsoft and Amazon, both headquartered in the Seattle region, have been the source of numerous spinoff companies directly (such as Expedia) and indirectly (such as Twilio). Together with spinoffs from the University of Washington, this record has given the region a rich genealogy of startups that become scaleups, begetting more startups.



#8 Global Ecosystem

Shanghai China

Ecosystem Phase: **Attraction**

Sub-Sector Strength: **Edtech**

Over 1,000 Edtech companies are headquartered in Shanghai, and they received about \$1.3 billion in venture funding between 2015 and 2017. Retech Technology, a vocational education startup, raised \$18 million in an IPO in 2017. 17zuoye is an online learning platform which became a unicorn in 2018 when it raised \$250 million in Series E funding led by Temasek Holdings. Zhangmen, a K-12 tutoring company, raised \$350 million in Series E funding from China Media Capital and CICC Alpha in January 2019.

Sub-Sector Strength: **Gaming**

China accounts for over 25% of global gaming revenue and is the world's largest mobile gaming market. Shanghai's gaming industry is expected to reach over \$15 billion by 2020. Shanghai is home to more than 130 gaming startups, a satellite for industry giants such as EA, Ubisoft, and Virtuos. In addition, Shanghai is host to ChinaJoy, Asia's largest gaming expo with over 340,000 attendees including participation from Giant players such as Sony, Xiaomi, and HTC.

"Shanghai has a very impressive mix of global corporate innovation, startup co-working and investment hubs that helps startups connect dreams to innovation, make ideas to reality."

Howard Wang

Incubation Director, Shanghai Caohejing Innovation Center

Why you should invest in Shanghai

2 Global Ecosystem
Gaming

#5 Global Ecosystem
Edtech

Software Startup Output **3k-4k**
Global Avg: 1,010

Ecosystem Value **\$52 bn**
Global Median: \$5 bn

9

Exit Growth Index

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Output Growth Index

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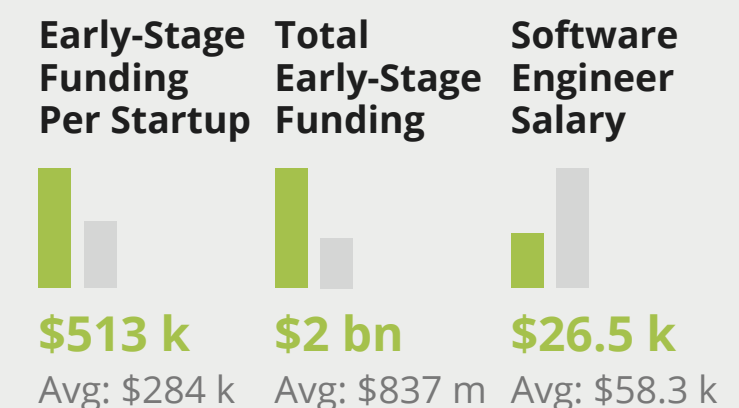
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Shanghai

Abundant funding: Shanghai's venture capital network includes about 5,000 angel investors and associations. The Shanghai science and technology innovation fund was launched by state-owned investors with an initial round of \$970 million.

R&D investment: Zhangjiang Hi-Tech Park, sometimes referred to as China's Silicon Valley, has more than 400 R&D institutions.



#14 Global Ecosystem

Singapore

Ecosystem Phase: **Attraction**



Sub-Sector Strength: **Blockchain**

Singapore ranks third globally in size of initial coin offerings (ICOs). In 2018, 82% of executives in Singapore reported that their organizations had started blockchain initiatives.. Fusion, a crypto-finance startup, raised \$110 million in an ICO in 2018 and subsequently secured \$12.3 billion in financial assets on their platform.



Sub-Sector Strength: **Fintech**

The Monetary Authority of Singapore has introduced a Fintech regulatory sandbox program, opened a Fintech Innovation Lab, and launched Fintech innovation village called LATTICE80. The ecosystem hosts Singapore FinTech Festival which is the biggest Fintech event in the world attracting more than 45,000 participants from 130 countries. Also, the FinTech Office, a virtual entity for all Fintech related matters, was set up in 2016. Credit Culture, a financial services provider, raised \$30 million from RCE Capital in 2019.

Startup Genome Member(s): Enterprise Singapore

"Singapore and Silicon Valley share a unique quality, they are magnets for talent across the globe. Magic is sparked when people from different backgrounds come together to solve a problem."

Vinnie Lauria

Managing Partner at Golden Gate Ventures

Why you should invest in Singapore



#4 Global Ecosystem

Blockchain



#5 Global Ecosystem

Fintech

Software Startup Output

2k-2.7k

Global Avg: 1,010

Ecosystem Value

\$25 bn

Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Singapore

Ease of doing business: Singapore is rated as the second best country to conduct business globally.

Tax breaks: The Startup Tax Exemption Scheme exempts 75% of a company's first \$73,000 in income. Singapore raised tax deductions for IP registration fees from 100% to 200% and qualifying expenses incurred on R&D from 150% to 250% in 2018.

Early-Stage Funding Per Startup



\$202 k

Avg: \$284 k

Total Early-Stage Funding



\$540 m

Avg: \$837 m

Software Engineer Salary



\$36.5 k

Avg: \$58.3 k



#11 Global Ecosystem

Stockholm Sweden

Ecosystem Phase: **Attraction**



Sub-Sector Strength: **Cleantech**

In 2017, Sweden ranked #third in UNIDO's Global Cleantech Innovation Index based on strong scores for innovation inputs and outputs. As part of the Clinton Climate Initiative, Stockholm Royal Seaport will be developed as the first city district in the world with full-scale smart grids. VOI Technology, an e-scooter startup, raised a \$50 million Series A round led by Balderton Capital in November 2018 followed by a \$30 million Series B round in March 2019.



Sub-Sector Strength: **Life Sciences**

Stockholm is home to Karolinska Institutet, which awards the Nobel Prize in Physiology/Medicine and is ranked #9 worldwide in Life Sciences and Medicine by QS World University Rankings. In 2016, Cormorant Pharmaceuticals, a developer of cancer and rare-disease therapies, was acquired by Bristol Myers Squibb for \$520 million. In 2018, KRY, a telemedicine app startup, raised a \$62 million Series B round in a deal led by Index Ventures.

"The explanation to Stockholm's many success stories can partly be found in a transparent society with flat hierarchies, a focus on gender balance and diversity, and the fact that we are raised to think for ourselves."

Pär Hedberg

Founder and CEO of Sting

Why you should invest in Stockholm

Top 15 Global Ecosystem
Cleantech

Top 20 Global Ecosystem
Life Sciences

Software Startup Output **900-1,200**
Global Avg: 1,010

Ecosystem Value **\$36 bn**
Global Median: \$5 bn

5

Exit Growth Index

7

Output Growth Index

9

Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Stockholm

Access to talent: In Stockholm, almost one-fifth of the entire workforce works in tech, the highest share of any other city in Europe. Companies also have access to top talent from some of Europe's top ranking universities, such as the Stockholm School of Economics, Karolinska Institutet and Royal Institute of Technology (KTH).

Early-Stage Funding Per Startup	Total Early-Stage Funding	Software Engineer Salary
\$700+ k	\$667 m	\$57.7 k
Avg: \$284 k	Avg: \$837 m	Avg: \$58.3 k

#6 Global Ecosystem

Tel Aviv Israel

Ecosystem Phase: **Attraction**

Sub-Sector Strength: AI, Big Data, & Analytics

Tel Aviv ranks #3 globally in the number of AI startups. In March 2018, Google set up a new startup accelerator focused on artificial intelligence and machine learning, its first outside the U.S. Later in October, Nvidia opened up a research center in the city to focus on AI. In 2018, AI chip developer Habana Labs raised \$75 million in Series B funding with Intel Capital as the lead investor. Retail giant Walmart acquired Aspectiva in early 2019 for an undisclosed amount.

Sub-Sector Strength: Cybersecurity

Israel exports \$6.5 billion in cybersecurity products per year. It was the first country to offer a Cybersecurity PhD and is home to six university Cybersecurity research centers. Cybersecurity exits in Israel totaled \$2.81 billion in 2018 including Sygnia, which was acquired by Temasek for \$250 million. Other local startup success stories include KELA Group, an advanced cyber intelligence software startup, that announced a \$50 million investment in 2018.

Startup Genome Partner(s): Tel Aviv Global

As we define throughout this report, an ecosystem is more than just the city it takes its name from. Includes cities in close proximity, like Rehovot, and goes from Haifa (north) to Ashkelon (south)

“Tel Aviv’s startup ecosystem is one of the most highly developed in the world. Israel has more startups per capita than any other country and its startups collectively raised \$6.47 billion in 2018.”

Uzi Scheffer
CEO of SOSA

Why you should invest in Tel Aviv

- #2 Global Ecosystem
Cybersecurity
- #3 Global Ecosystem
Artificial Intelligence

Software Startup Output **2.8k - 3.7k**
Global Avg: 1,010

Ecosystem Value **\$30 bn**
Global Median: \$5 bn

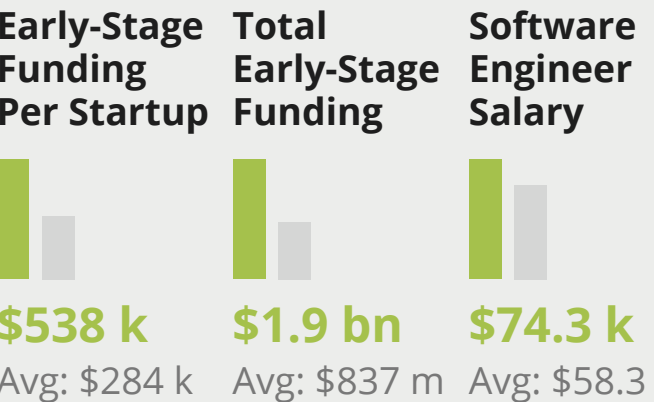


Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Tel Aviv

Density of startups and R&D hubs: Tel Aviv has the highest number of startups per capita in the world after Silicon Valley and houses over 73 R&D centers from companies including Visa, Bosch, and Google.

National pre-seed fund: The TNUFA National Pre-Seed Fund offers grants of up to 85 percent of approved expenses.



#5 Global Ecosystem

Boston United States

Ecosystem Phase: **Integration**



Sub-Sector Strength: **Adv. Manufacturing & Robotics**

Boston has access to world-class talent from institutions like MIT and Harvard and robotics companies employ more than more than 4,700 people. The city is also bringing more access to technology in classrooms in the form of makerspaces and 3D printing facilities. Desktop Metal, one of the leading unicorns and a developer of metal 3D printers, raised \$160 million in a Series E round in 2019. Other major funding rounds in 2019 include Veo Robotics’ \$15 million Series A round and Humatics’ \$28 million Series A round.



Sub-Sector Strength: **Life Sciences**

Boston has more than 1,100 Life Sciences companies, seven teaching hospitals, and five of the top six NIH-funded independent hospitals in the U.S. MLSC runs a \$1 billion Life Sciences Initiative, which provides research grants, accelerator loans, tax incentives, etc. In 2018, Moderna launched the largest Biotech IPO in the world with a valuation of \$7.5 billion. In 2019, Dewpoint Therapeutics raised \$60 million in one of the largest-ever Series A rounds in Boston.

“Boston is home to a buzzing startup ecosystem across many sectors—cleantech, biotech, and robotics. We strongly believe that our regional community thrives because of all the stakeholders that are committed to supporting local, early-stage companies.”

Dr. Emily Reichert
CEO at Greentown Labs

Why you should invest in Boston

- #2 Global Ecosystem **Life Sciences**
- #2 Global Ecosystem **Adv. Manufacturing & Robotics**

Software Startup Output **3K-4.1K**
Global Avg: 1,010

Ecosystem Value **\$42 bn**
Global Median: \$5 bn

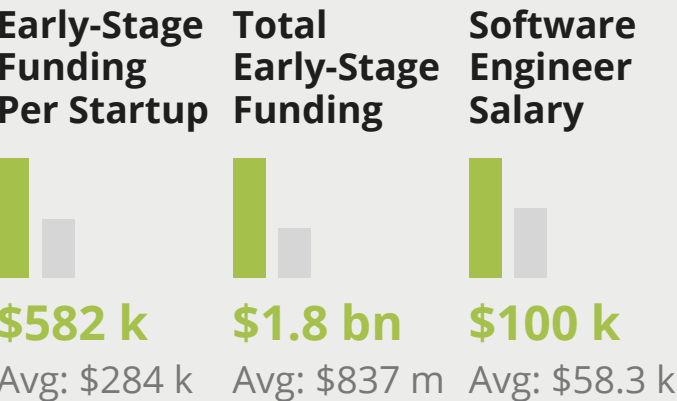


Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Boston

Top startup programs: More than 50 accelerators and incubators, including global programs including MassChallenge, operate in Boston.

Tax credits: The state of Massachusetts offers an R&D tax credit in addition to the federal one. This gives an edge to attracting research-intensive companies from other states.



#3 Global Ecosystem

London United Kingdom

Ecosystem Phase: **Integration**

Sub-Sector Strength: **Edtech**

The U.K.'s Edtech sector is expected to reach \$4.4 billion by 2021 and current U.K. education exports total \$22.8 billion annually. London has more than 500 Edtech companies and ranks #1 in Europe for early-stage funding in Edtech. Kano, a computing kit and coding platform startup, raised \$28 million in 2017. Memrise, a language learning platform, raised \$15.5 million in 2018.

Sub-Sector Strength: **Fintech**

London is the second -largest financial center in the world, produced 3 Fintech unicorns in 2018, and has a financial sector employing more than 315,000 people. In 2018, the Financial Conduct Authority launched a global Fintech regulatory sandbox after the success of a domestic sandbox that loosened financial regulations. OakNorth, a debt finance solution startup, raised \$100 million and became a unicorn in October 2018. The company raised an additional \$440 million early in 2019.

Startup Genome Member(s): Tech Nation

"London has an established position at the cutting edge of tech. Previously in Fintech, but now also AI and Healthtech. It's critical we leverage this advantage — attract the best talent and build a supportive ecosystem."

Suranga Chandratillake

Partner at Balderton Capital

Why you should invest in London

#2 Global Ecosystem

Fintech

#4 Global Ecosystem

Funding

Software Startup Output **4.7k-6.4k**
Global Avg: 1,010

Ecosystem Value **\$47 bn**
Global Median: \$5 bn

8

Exit Growth Index

5

Output Growth Index

4

Funding Growth Index

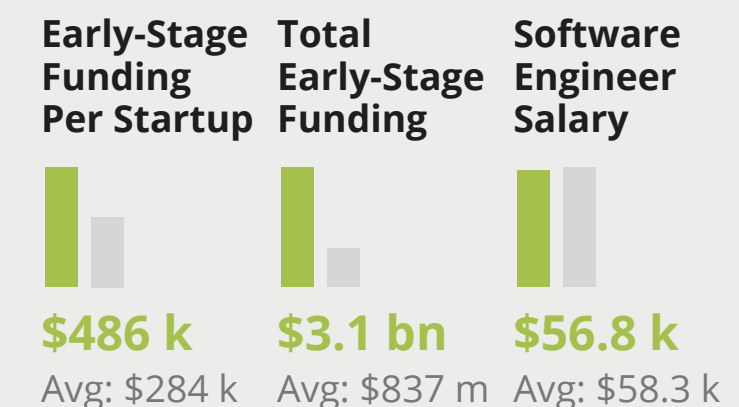
Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to London

Seed Enterprise Investment Scheme:

A vibrant early-stage funding environment has developed thanks to this, which provides investors up to £150,000 of their investment back in income tax relief.

Startup visa: London is the only top 5 ecosystem with a startup visa program which was launched in the spring of 2019 .



#2 Global Ecosystem

New York City United States

Ecosystem Phase: **Integration**

Sub-Sector Strength: **AI, Big Data, & Analytics**

New York boasts the highest percentage of AI and machine-learning job positions in a single U.S. metro area. Recent 5-year growth in AI and Big Data VC funding is higher in New York City than the Bay Area and Boston. Datorama, an AI marketing platform, was acquired for \$800 million in 2018.

Sub-Sector Strength: **Cybersecurity**

Cybersecurity is a billion-dollar industry in New York, with over 100 companies and over 6,000 employees as of 2017. Cyber NYC, an initiative to catalyze 10,000 jobs, is a \$100 million public-private investment led by the City. Medigate, a medical security platform, raised \$15 million in 2019.

Sub-Sector Strength: **Life Sciences**

New York City has nine academic medical centers, over 50 hospitals, and over 100 research foundations. The city is home to Life Sciences startups like Flatiron Health, acquired by Roche for \$2.1 billion and Schrödinger, which received \$85 million in 2019.

Startup Genome Member(s): New York City Economic Development Corporation, Tech:NYC

"Now more than ever, New York's tech sector stands out as a top global innovation hub. With record job and investment growth, we've become America's talent capital, with a future poised for more."

Julie Samuels

Executive Director of Tech:NYC

Why you should invest in New York City

 #2 Global Ecosystem **Funding**

 #4 Global Ecosystem **Life Sciences**

Software Startup Output **7k-9.5k**
Global Avg: 1,010

Ecosystem Value **\$64 bn**
Global Median: \$5 bn

5
Exit Growth Index

6
Output Growth Index

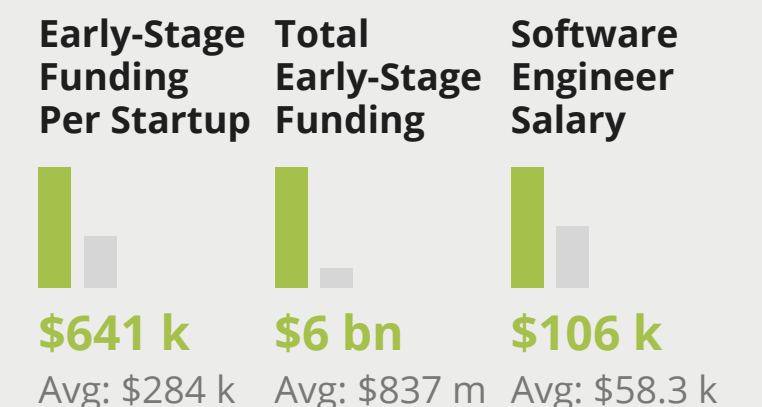
6
Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to New York City

World's second largest tech ecosystem: With over 9,000 startups, numerous unicorns, over 100 accelerators, incubators, and co-working spaces, the city's tech sector is booming.

Diverse and cosmopolitan city: The city has 8.5 million residents, 47 Fortune 500 companies, and 410,000 women-owned businesses. Nearly 50% of NYC's tech workers are foreign-born.



#1 Global Ecosystem

Silicon Valley – Bay Area

Ecosystem Phase: **Integration**

United States



Sub-Sector Strength: **AI, Big Data, & Analytics**

Seven of the world's top 10 AI investors — companies like Google, Facebook, and Apple — are based in Silicon Valley. In 2018, Automation Anywhere raised \$550 million in Series A financing over two rounds, and Snowflake Computing raised \$450M in a Series F round.



Sub-Sector Strength: **Fintech**

Drawn by the region's strength in Fintech, global financial companies increasing their presence in the region. JP Morgan recently announcing plans to open a Fintech innovation hub by 2020. Stripe, a Fintech unicorn, raised \$245 million in 2018, followed by a \$100 million in Series E in 2019.



Sub-Sector Strength: **Life Sciences**

Silicon Valley has a long history of innovation Life Sciences, producing success stories such as Genentech and Exelixis. It is home to more than 1,400 Life Sciences companies employing over 52,000 people. In 2018, Grail raised \$300 million in Series C funding and Hologic acquired Focal Therapeutics for \$125 million.

“Despite rising real estate prices and increased scrutiny, Silicon Valley remains a vibrant place for startups. In fact, the external forces acting on Silicon Valley are changing how companies develop products and manage teams.”

Robert Siegel

Partner at XSeed Capital and Lecturer in Management, Stanford Graduate School of Business

Why you should invest in Silicon Valley - Bay Area



#1 Global Ecosystem



Life Sciences



#1 Global Ecosystem



Artificial Intelligence

Software Startup Output

13k-18k

Global Avg: 1,010

Ecosystem Value

\$312 bn

Global Median: \$5 bn



Exit Growth Index



Output Growth Index



Funding Growth Index

Indices calculated on a scale of 1 (lowest) to 10 (highest)

Reasons to move your startup to Silicon Valley - Bay Area

Ranks #1 across the board: Silicon Valley top in most startup Sub-Sector rankings from AI, to Robotics, to Life Sciences. It is the world's main unicorn factory, producing more than 89 through March 2019.

World-class resources: Startups have access to talent (Stanford University, UC Berkeley and USCF), capital, plus numerous investors and mentors.

Early-Stage Funding Per Startup



\$700+ k

Avg: \$284 k

Total Early-Stage Funding



\$11.7 bn

Avg: \$837 m

Software Engineer Salary



\$115 k

Avg: \$58.3 k





Methodology, Framework, and Acknowledgments

155	Acknowledgments and Partners
172	Methodology
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Acknowledgments and Partners



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Founder and CEO. Silicon Valley serial entrepreneur JF has founded five businesses in two continents, with two successful exits, two ongoing, and one miserable failure, a source of much learning. He is also an active angel investor, founder of a coworking space, and an adviser to VCs on investment decisions. He started in banking, and then moved to tech strategy and corporate innovation, advising IBM, Cisco, Agilent/HP, J&J, Abbott, and others, for the firm of Kim Clark, former Dean of Harvard Business School, alongside Clayton Christensen and other thought-leaders. JF has an MBA from Harvard.

Dane Stangler

Chief Policy Officer. Dane specializes in entrepreneurship development and economic growth, and provides insights and policy analysis for startup ecosystems worldwide. He is Visiting Vorzimer Professor of Entrepreneurship at LIU Post and former Vice President for Research and Policy at the Ewing Marion Kauffman Foundation. A frequent public speaker and writer, Dane's work has appeared in The Wall Street Journal, Huffington Post, Forbes, and Washington Monthly, and

he is frequently quoted by national broadcast and print outlets.

Marc Penzel

Founder and COO, Marc is leading global growth and impact. Prior to founding Startup Genome, he co-led the startup ecosystem development unit at Silicon Valley-based Startup Compass. At PwC, KPMG, and Bayer Group’s internal management consultancy, Marc advised top executives across various sectors. He also founded a nonprofit organization to catalyze social innovation and was appointed Expert in Entrepreneurship, IT and Future of Economic Progress by the World Economic Forum. In 2017, his work to develop startup ecosystems everywhere has led him to receive a U.S. Visa for Individuals with Extraordinary Ability or Achievement.

Arnobio Morelix

Director of Research. Arnobio focuses on ecosystem assessment, especially within Deep Tech and Life Sciences IP production. Arnobio has worked for the Kauffman Foundation, where he created the Growth Entrepreneurship Index and the Main Street Entrepreneurship Index, hailed as the “bible of entrepreneurship trends” by The Huffington Post and used by senators, governors, city leaders, Fortune 500 companies, and the White House. His work has been covered in The New York Times, The Economist, and The Wall Street Journal.

He also serves data science-focused appointments at Inc. Magazine and Stanford University.

Lubin Arora

Senior Research Manager. Lubin focuses on assessment and development of startup ecosystems. Previously, he worked with Bain & Company’s global marketing team. Prior to Bain, he worked at Evalueserve, supporting a leading magic circle law firm’s strategy team. He started his career as an analyst with McKinsey & Company working across industries and functions.

Global Entrepreneurship Network (GEN)

Jonathan Ortmans

Founder and President of the Global Entrepreneurship Network, an organization that provides a platform of initiatives to help new firms start and scale within one global ecosystem. Through GEN, Jonathan has assembled a multi-disciplinary coalition in 170 countries that includes entrepreneurs, investors, policymakers, researchers, and affiliated support organizations. He chairs the Global Entrepreneurship Congress each year, gathering thousands of leaders to explore innovative approaches to advancing entrepreneurial growth. Jonathan is a longtime advisor to the Kauffman Foundation and serves on numerous boards in various countries around the world.

Survey Participants and Interviewees

Thanks to the more than 10,000 survey participants and the over hundred interviewees—startup founders, investors, leaders of accelerators, incubators and startup hubs, and policy-makers—all over the world who trusted us by sharing their confidential information and expert knowledge with us. By providing us with solid quantitative data and insights, they created the basis and the heart of our research.

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Tegan Spinner, Founder at Lokalist

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Barbara Burger, President of Technology Ventures at Chevron

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Louise Ferslev, CEO & founder at MyMonii

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- **Hello Tomorrow:** A global non-profit organization on a mission to unlock the potential of deep technologies to solve the world's toughest challenges by highlighting, empowering and connecting the most promising deeptech entrepreneurs across the globe with the right enablers. They bring together a community of actors to facilitate collaboration between entrepreneurs, industries and investors in order to propel innovation from the lab to the market.
- **CrunchBase:** Everyday investors, journalists, founders, and the global business community turn to CrunchBase for information on startups and the people behind them.
- **Dealroom.co** provides data-driven intelligence on high-growth companies.
- **Orb Intelligence:** Business Information for B2B Marketing and Sales. Orb provides company information and smart algorithms as a service to marketing software vendors and B2B agencies.
- **Angel Resource Institute:** Provides education, training, mentoring, and information on best practices in

the field of angel investing to improve connections between angel investors and entrepreneurs.

- **Tech Nation (formerly Tech City UK):** Empowers ambitious tech entrepreneurs through growth programmes, digital entrepreneurship skills, a visa scheme for exceptional talent and by championing the UK digital sector through data, stories and media campaigns.
- **Bella Private Markets:** Provides actionable advice on private capital challenges. Combining rigorous academic approaches with real world industry expertise, our expert team focuses on complex, customized projects that require thorough analysis, whether quantitative or qualitative in nature, to help our clients assess or design strategies, improve performance, and chart winning strategies for the future.

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- **TNW Conference:** Global Startup Ecosystem Report 2019 was launched at TNW 2019

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ChargeBee is a PCI Level 1 certified recurring billing platform for subscription based SaaS and eCommerce businesses. It handles all your crucial workflows from lead to ledger with power packed integrations that include Salesforce, Xero, Quickbooks, Avalara, Slack, among others.

Methodology

The Startup Genome quantitative data infrastructure includes data on over 1 million companies, 150 ecosystems, and survey data from more than 10,000 startup executives across the globe -- the Voice of Entrepreneurs.

Below is a description of the main datasets that make up this data science infrastructure:

- Startup Genome proprietary data:
 - Interview of 100+ Experts
 - 2017-2019 Startup Ecosystem Survey with more than 10,000 participants per year
- Crunchbase: global dataset on funding, exits, and locations of startups and investors
- Orb Intelligence: global dataset on company information
- PitchBook: private capital market data provider

- Dealroom: global dataset on funding, exits, and locations of startups and investors
- Local partners (accelerators, incubators, startup hubs, investors):
 - list of startups
 - list of local exits and funding events

Data Sources

Primary Data Sources

In alphabetical order

Crunchbase (2017-2019). Crunchbase.com Database

Dealroom.co BV. (2017-2019). Dealroom.co Database

Orb Intelligence Inc. (2017-2019). orb-intelligence.com Database

PitchBook (2018-2019), a private capital market data

provider Database

Startup Genome LLC (2017-2019). StartupGenome.com Database

Startup Compass Inc. (2015). The Startup Ecosystem Report 2015 Survey

Secondary Data Sources

- Forbes 2000
- GitHub API
- International IP Index
- Meetup.com
- OECD, R&D Spending
- Other sources from Life Sciences Rankings
- Salaries data from Glassdoor, Salary.com, and PayScale
- Shanghai Rankings

- Techboard
- Times Higher Education Rankings
- Top 800 R&D Hospitals, Webometrics
- USPTO
- WIPO
- World Bank, Ease of Doing Business

Selected Data Timeframes

- Ecosystem Value, Exit Value, and Startup Valuation: sum of exits and funding rounds of 2016, 2017 and first half of 2018.
- Based on our previous analysis we assessed that it takes one year for half of the seed rounds to find their way into major data sources. Therefore, we use the first half of 2018 as the latest period for which earlier-stage metrics can be computed to create reliable benchmarks at the ecosystem level.
- Early-Stage Funding: Sum of all Seed and Series A investments in 2016, 2017, and first half of 2018, corrected for obviously missing rounds.

Ranking Methodology

Overall Ranking

The overall global ecosystem ranking is a weighted average of the following factor scores:

- Performance: 30%
- Funding: 20%
- Market Reach: 12.5%
- Connectedness: 12.5%
- Talent: 10%
- Experience: 10%
- Knowledge: 5%

We calculated an ecosystem index value for each factor, based on the sub-factor and metrics detailed below. The ecosystems scores were multiplied by the above weights to establish the overall rank of each ecosystem. The weights of the factors were determined in 2017 and adjusted in 2019 through correlation analyses and modeling work based on linear regression analyses, using factor indexes as independent variables with the performance index as dependent variable. Finally, adding the actual Performance Index to the ranking formula serves to include the influence of unobserved factors on the performance of an ecosystem.

Ranking Details

Performance

Captures the actual leading, current, and lagging indicators of ecosystem performance.

- 40% Ecosystem Value = log of sum of all exits and estimated startups valuations during the timeframe without double-counting
- 30% Exits
 - 80% Volume of Exits (80% log of number of exits of \$50M+ and 20% number of exits of \$1B+)
 - 20% Exit Growth Index (scored from 1 to 10)
- 20% Software Startup Output
 - 80% Output (log of number of startups)
 - 20% Output Growth Index (scored from 1 to 10)
- 10% Startup Success
 - 60% Growth-Stage Success (90% Ratio of Series C-to-A Startups and 10% log of number of billion-dollar club startups)
 - 30% Speed to Exit (50% average company age at exit and 50% average company age at IPO)
 - 10% Early-Stage Success (Ratio of Series B-to-A Startups)

Funding

Quantifies funding metrics important to the success of early-stage startups.

- 90% Access
 - 90% Early-Stage Funding Volume (80% log of count and 10% sum of total early-stage funding deals + 10% log of early-stage funding per startup)
 - 10% Early-Stage Funding Growth (scored from 1 to 10)
- 10% Quality
 - 70% Volume of Investors (50% log of total number of VCs and CVCs; and log of 50% total number of large \$100M+ AUM VCs and CVCs)
 - 20% Experience of Investors (80% number of investors with above average exit rates, 10% number of investors with exits, 5% average years of experience of investors and 5% average exit ratio for portfolios)
 - 10% Investor Activity (80% total number of new investors and 20% ratio active investors with investments in past 12 months)

Market Reach

Measures early-stage startup access to customers allowing them to scale and “Go-Global.”

- 80% Global and Local Reach
 - 80% Global Reach (% of foreign customers, normalized by country GDP, so that ecosystems in countries with large economies do not need to have a percentage of foreign customers as high as ecosystems in smaller economies)
 - 20% Local Reach (log of country GDP)
- 20% Commercialization of Tangible IP Assets (tiers from 1 to 5, score based on the International IP Index, measured at the country level)

Connectedness

Measures how connected the ecosystem is to the global fabric of knowledge (Global Connectedness) and within the ecosystem (Local Connectedness and Innovation Infrastructure).

- 45% Global Connectedness
 - 90% International Outbound (number of relationships with founders from top ecosystems)
 - 10% Local Meeting (number of founders of top ecosystems met locally)
- 45% Local Connectedness
 - 50% Sense of Community (a sub-factor of Local Connectedness capturing the degree to which founders informally receive help from investors,

experts, and fellow founders: 50% average hours local founders got helped by investors + 50% average hours local founders got helped by fellow founders)

- 33% Founder Relationships (number of quality relationships between local founders, where they know each other and can call upon the other for help “this week”: 60% average number of relationships with other founders + 30% average number of relationships with investors + 10% average number of relationships with experts)
- 17% Collision Index (60% log of number of local tech events and 40% density of tech events)
- 10% Infrastructure (a Life Sciences-focused measure of accelerators and incubators, research grants, and R&D anchors in the ecosystem, further described in the Life Sciences section of the Methodology)

Talent

Assesses the talent early-stage startups have access to.

- 90% Tech Talent
 - 80% Access (50% Experienced Software Engineers: percentage with 2+ years prior experience in a startup, and 50% Experienced Growth Team: percentage with 2+ years prior experience in a startup)
 - 10% Quality (70% log of density of top developers

on GitHub, 10% log of number of top developers on GitHub, 10% English Proficiency in ecosystem and 10% log of \$50M+ historical exits, a proxy for experienced scaled teams in the ecosystem)

- 10% Cost (log of software engineer salary — lower is better — from Glassdoor, Salary.com, and PayScale)
- 10% Life Sciences Talent = Life Sciences Talent Score, further described in the Life Sciences section of the Methodology

Experience

Captures the degree of startup experience in an ecosystem and the degree to which its founders espouse practices that are known to positively impact a startup's success based on Startup Genome research.

- 50% Startup Experience in Ecosystem (log of the cumulative number of early-stage companies started and funded in the ecosystem at Seed, Angel, and Series A stages)
- 40% Team Experience (how much founding teams have previous startup experience and adopt best practices associated with startup success - such as offering stock options to all employees and average number of advisors with equity)
 - 40% stock options to all employees

- 30% number of advisors with equity
- 30% number of founders with hypergrowth experience
- 10% Scaling Experience in Ecosystem (the cumulative number of significant exits, over \$50 million and \$1 billion, over 10 years for startups founded in the ecosystem)
 - 60% log of number of exits of \$1B+
 - 40% log of number of exits of \$50M

Knowledge

The Knowledge Success Factor assesses:

- 80% Patents (the volume, complexity, and potential of patents in Life Sciences created in the ecosystem, further described in the Life Sciences section of the Methodology)
- 10% Research (H-index, a measure of publication impact, this metric looks at the production of Life Sciences research at the country level)
- 10% Policy (70% Days to Clinical Trial Authorization — faster is better, and 30% Public R&D Spending; both measured at the national level)

Growth Index

- 33.3% Exit Growth Index: Index of growth in tech startup exits in the ecosystem from 2015-2016 to 2017-2018. Measured on a scale of 1-10
- 33.3% Funding Growth Index: Index of growth in early-stage funding (Seed and Series A) in tech startups in the ecosystem from 2014-2015 to 2016-2017. Measured on a scale of 1-10
- 33.3% Output Growth Index: Index of growth in total startup creation in the ecosystem, calculated in an annualized growth rate from 2014 to 2018. Measured on a scale of 1-10

Life Sciences Ranking Methodology

The overall global ecosystem ranking is a weighted average of the following factor scores:

- Performance: 30%
- Funding: 20%
- Talent: 10%
- Knowledge: 20%
- Infrastructure: 15%
- Policy: 5%

Because startup activity in Life Sciences can be rarer across ecosystems than when we look at all startups

as a whole, we use different timeframes than the ones used in the Overall Rankings.

Performance

Captures the actual leading, current, and lagging indicators of ecosystem performance.

- 45% Exits (the number and value of exits -- public offerings and acquisitions -- over \$1 billion and \$50 million in Life Sciences)
 - 80% number of exits of \$50M+ [2H2013-1H2018]
 - 20% number of exits of \$1B+ (90% count of exits and 10% sum of value of exits) [2H2013-1H2018]
- 45% Software Startup Output (this encompasses both the overall number of Life Sciences startups in an ecosystem and the share of overall Startup Output that Life Sciences startups account for)
 - 80% log of Output (number of startups in Life Sciences)
 - 20% Focused Output (% of startups in Life Sciences)
- 10% Growth Stage Success (the number of Life Sciences startups with valuations over \$1 billion)

Funding

Quantifies funding metrics important to the success of

early-stage startups.

- 90% Access (the amount of early-stage funding and number of early-stage deals (seed and Series A) in an ecosystem)
 - 50% log of number of early-stage funding deals [2H2013-1H2018]
 - 50% log of amount of early-stage funding deals [2H2013-1H2018]
- 10% Quality (measured by the number of local Life Sciences investors, experience of investors (average years of experience and exits ratio), and activity of investors (percentage of active investors in past 12 months and number of new investors)
 - 70% Volume of Investors (40% log of number of investors specialized in Life Sciences, 40% log of number of Life Sciences investors including non specialized, and 20% log of number of large \$100M+ AUM Life Sciences investors)
 - 20% Experience of Investors (80% number of investors with above average exit rates, 10% number of investors with exits, 5% average years of experience and 5% average of success ratio)
 - 10% Investor Activity (80% log of total number of new investors and 20% active investors with Life Sciences investments in past 12 months)

Talent

Assesses the talent Life Sciences startups have access to. For this Factor, we analyzed all subjects included in Shanghai Rankings and matched to the relevant Startup Sub-Sectors to calculate the following metrics:

- 60% Quality
 - 66.6% log of average quality score of top universities with Life Sciences-related programs
 - 16.6% log of average research impact of top Life Sciences universities in the ecosystem
 - 16.6% log of average research production score of top Life Sciences universities in the ecosystem
- 40% Access
 - 90% Life Sciences-Specific Talent Access (60% log of number of top feeder degree programs associated to Life Sciences, and 40% log of number of top universities ranked in Life Sciences-related subjects)
 - 10% STEM Talent Access (log of estimated number of STEM students in top universities, as ranked in Times of Higher Ed)

Knowledge

For this Factor we analyzed 600+ technology classes in patents to match them to Life Sciences when relevant to calculate the following metrics:

- 80% Patent
 - 58.3% Log of number of patents in Life Sciences
 - 25% Growth in Patent Creation in Life Sciences
 - 8.3% Ecosystem Knowledge Space Complexity, a measure of the capacity of the ecosystem for producing patent in complex technology classes, based on a PageRank algorithm¹
 - 8.3% Technology Potential, a measure calculated at the technology class level globally and calculated for each ecosystem based on the technologies it produces
 - 20% Complexity of Technology Class, based on a PageRank algorithm²
 - 30% Global Growth of Technology Class
 - 50% Size of Technology Class (log of number of global patents in class)
- 20% Research = H-index, a measure of publication impact, this metric looks at the production of Life Sciences research at the country level.

1. <https://tandfonline.com/doi/abs/10.1080/00343404.2018.1437900>
2. <https://tandfonline.com/doi/abs/10.1080/00343404.2018.1437900>

Infrastructure

A Life Sciences-focused measure of accelerators and incubators, research grants, and R&D anchors in the ecosystem (e.g., top research hospitals and R&D corporate labs).

- 50% Research Grants (log of sum of Life Sciences research grants received in an ecosystem)
- 10% Accelerators and Incubators (log of number of Life Sciences-focused accelerators and incubators)
- 40% R&D Anchors (number of top research hospitals, corporate R&D locations in Life Sciences, and grant-funded research organizations)
 - 50% log of R&D Locations of Corporates
 - 25% log of Grant-Funded Research Organisations
 - 25% log of Top R&D Hospitals

Policy

Compared to startups in software, Life Sciences startups are more affected by public policy because of the need to undergo clinical trials and receive government approval. The policy components identified here are measured at the national level, rather than the ecosystem level.

- 60% Public R&D Spending (log of the value of public R&D expenditures)

- 30% Commercialization of IP Assets (indicator of how much the policy environment encourages the commercialization of tangible IP, scored from 1 to 5)
- 10% Clinical Trial Authorisation (count of days required to authorize clinical trials, a measure of speed in the regulatory environment for Life Sciences)

Sub-Sector Ranking Methodology

Sub-sector rankings are all based on a combination of the same set of seven factors, although not all of the seven factors are included for all sub-sectors. As we show on the table below, the Performance, Funding, Talent, Experience, and Focus Factors are used across all sub-sector rankings. The Knowledge Factor — measuring tangible IP production — is only applicable to Deep Tech-related sub-sectors, and the Legacy Factor is only applicable to either vertically-focused Deep Tech-related sub-sectors (e.g., Life Sciences) or sub-sectors with clear traditional-industry ties ins (e.g., Fintech).

The metrics in each of these Factors are described below.

Because startup activity in many sub-sectors can be rarer across ecosystems than when we look at all startups as a whole, we use different timeframes than the ones used in the Overall Rankings.

			Performance	Funding	Talent	Knowledge	Experience	Focus	Legacy
Deep Tech	Horizontal	AI	20	20	20	10	10	20	
		Blockchain	30	20	20	10	10	10	
	Vertical	Life Sciences [1]	-	-	-	-	-	-	-
		Advanced Manufacturing & Robotics	20	20	10	10	10	10	20
		Agtech & New Food	20	20	10	10	10	10	20
Tech	Traditional Industry Tie	Cleantech	30	20	10	10	10	10	10
		Fintech	30	20	10		10	20	10
		Cybersecurity	30	20	20		15	15	
		Edtech	30	25	20		15	10	
		Gaming	30	20	20		15	15	
		Adtech	30	20	20		15	15	
		Digital Media	30	20	20		15	15	

Weights assigned to each factor

Performance

- 50% Exits
 - 60% log of number of all exits
 - 40% log of number of all \$50M+ exits [2014-2018]
- 40% Startup Creation = log of number of startups in our database
- 10% Startup Success = log of number of \$1B+ startups

Funding

- 90% Early-Stage Funding (log of number of early-stage funding deals) [2014-2018]

- 10% Late-Stage funding (log of number of Series B+ rounds) [2014-2018]

Talent

For Talent, we analyzed all subjects included in Shanghai Rankings and matched to the relevant Startup Sub-Sectors to calculate the following metrics:

- 40% Access
 - 50% log of number of top feeder degree programs offered in ecosystem related to the sub-sector
 - 50% log of number of top universities ranked in sub-sector related subjects

- 60% Quality

- 60% log of average quality score of top universities related to the sub-sector
- 10% log of average research impact of top universities in the ecosystem related to the sub-sector
- 30% average research production score of top universities in the ecosystem related to the sub-sector

Knowledge

For this Factor we analyzed 600+ technology classes in patents to match them to each relevant Startup Sub-Sector to calculate the following metrics:

- 80% Patents (log of number of patents related to the sub-sector)
- 10% Ecosystem Knowledge Space Complexity, a measure of the capacity of the ecosystem for producing patent in complex technology classes, based on a PageRank algorithm³
- 10% Tech Potential, a measure calculated at the technology class level globally and calculated for each ecosystem based on the technologies it produces
 - 20% Complexity of Technology Class, based on a PageRank algorithm⁴
 - 30% Global Growth of Technology Class
 - 50% Size of Technology Class (log of number of global patents in class)

Experience

- 60% Exits (log of number of historical \$50M+ exits, as a proxy for number of scaled teams in the ecosystem [2008-2018])
- 40% Venture A Funding (log of number of of historical Series A funding deals, as a proxy for number of teams that raised funds in the ecosystem [2008-2018])

3. <https://tandfonline.com/doi/abs/10.1080/00343404.2018.1437900>
 4. <https://tandfonline.com/doi/abs/10.1080/00343404.2018.1437900>

Focus

- % of startups related to the sub-sector in the ecosystem

Legacy

- 50% Number of Employees (log of number of employees in Forbes 2000 companies related to the sub-sector)
- 50% Market Cap (log of sum of market value of Forbes 2000 companies related to the sub-sector)

Ecosystem Deep Dive Metrics

Software Startup Output

Number of software startups in the ecosystem, calculated using MSE (Multiple System Estimation) method

Ecosystem Value

A measure of economic impact, calculated as the value of exits and startup valuations over 2016, 2017, and the first half of 2018

Exit Growth Index

Index of growth in tech startup exits in the ecosystem from 2015-2016 to 2017-2018. Measured on a scale of 1-10, where 10 is the highest tier of growth observed

and 1 is the lowest

Funding Growth Index

Index of growth in early-stage funding (Seed and Series A) in tech startups in the ecosystem from 2014-2015 to 2016-2017. Measured on a scale of 1-10, where 10 is the highest tier of growth observed and 1 is the lowest

Output Growth Index

Index of growth in total startup creation in the ecosystem, calculated in an annualized growth rate from 2014 to 2018. Measured on a scale of 1-10, where 10 is the highest tier of growth observed and 1 is the lowest

Total Early Stage Funding

Total Seed and Series A funding in tech startups in 2016, 2017, and first half of 2018

Early-stage Funding per Startup

Average early-stage funding per startup in the ecosystem

Software Engineer Salary

Average software engineer salary (lower is better): from Glassdoor, Salary.com, and PayScale; as well as local sources when applicable

Key Concepts and Definitions

Ranking Score

The ranking is primarily driven by one question: In which ecosystems does an early-stage startup have the best chance of building a global success?

Startup

Steve Blank defines a startup as a “temporary organization in search for a repeatable and scalable business model.” We use this definition to look across sectors and sub-sectors, including software, hardware, health, energy, and others.

Ecosystem

Defined around the concept of a shared pool of resources, generally located within a 60-mile (100-kilometer) radius around a center point in a given region, with a few exceptions based on local reality.

Ecosystem Lifecycle Factors

Combined with some of measures from our Success Factor Model, Ecosystem Lifecycle Factors measure different dimensions of a startup ecosystem. These allows us to determine the phase of development in which the ecosystem is in -- Activation, Globalization,

Attraction, or Integration.

- **Resource Attraction:** captures the extent to which entrepreneurs move to an ecosystem to start a startup and how many startups relocate to an ecosystem. Increasing Resource Attraction at the national and global levels is an important determinant of an ecosystem’s growth rate.
- **Startup Leakage:** measures the percentage of startups that, in our global survey, reported leaving a certain ecosystem. A low score on Startup Leakage indicates that few startups have left that ecosystem in favor of another one.
- **Triggers:** Triggers are the externally impressive exits and high startup valuations that spark a sharp increase in Resource Attraction, driving the growth of an ecosystem and its evolution to the next phase of the Lifecycle.

Ecosystem Success Factors Model

Our principal analytical tool, this measures different dimensions of what supports the performance of local startups. We look at nine factors for our rankings: one measuring actual performance, with eight Success Factors associated with performance, each comprised of sub-factors and metrics. These factors are highlighted in our Methodology section, as well as in each rankings section.

- **Performance:** A combination of leading, lagging, and current indicators that capture economic outcomes in a startup ecosystem.
- **Funding:** The level and growth of early-stage funding, looking at both access and quality.
- **Market Reach:** How well startups in a given ecosystem are able to reach customers outside their country and the immediate continental region.
- **Global Connectedness:** How well founders are meaningfully connected to founders in other ecosystems, with a focus on the world’s top seven ecosystems.
- **Resource Attraction:** The gravitational pull of an ecosystem in drawing in entrepreneurs and startups from elsewhere.
- **Startup Experience:** The depth and diversity of the pool of prior startup experience in an ecosystem.
- **Talent:** Measures the accessibility, quality, and cost of software engineering expertise.
- **Founder:** success factors related to the startup founder, under his or her control, or internal to the startup as opposed to external (a function of the ecosystem)
 - **Founder DNA:** The background, experience, ambition, and motivation of local founders.
 - **Founder Go-Global Strategy:** measures whether

a startup is going global from the outset or first targets its local market, and whether its customer acquisition team is located, targeted, and skilled to succeed.

- **Founder with High Ambition:** Founders who expressed all of the following attributes: Total Addressable Market of \$30 billion USD or more; developing a globally-new, or one of the globally-leading or niche products; and the mission to change the world, get rich or create a great product.
- **Founders with Experience in Sub-Sector:** founders who considered their graduate or postgraduate degree to be directly relevant to their startup.
- **Local Connectedness:** A multi-variable assessment of the local community, including sense of community, relationships, and collisions between founders, investors, and experts.
 - **Sense of Community Index:** a sub-factor of Local Connectedness capturing the degree to which founders informally receive help from investors, experts, and fellow founders.
 - **Number of Relationships Between Founders:** number of quality relationships between local founders, where they know each other and can call upon the other for help “this week”.
 - **Collision Index:** a sub-factor of Local Connectedness capturing the number of tech events on

Meetup.com and the density of tech events per startup in the ecosystem.

Sector and Sub-Sector Definitions

Below are our definition for each startup Sub-Sector analyzed here. Note that sub-sectors are not mutually exclusive nor comprehensive — some startups are in sub-sectors we did not consider.

In addition, at least from patents, the data shows a clear tech convergence. Technology like AI software are increasingly inter-related, and we would expect a similar convergence overtime for Startup Sub-Sectors.⁵

For more detail, including in our machine learning classification of sub-sectors, please see our Startup Classification sub-section in this Methodology. For more coverage on each sub-sector, please see their respective sections in the report.

Advertising Tech (Adtech)

Advertising Tech captures different types of analytics and digital tools used in the context of advertising and marketing. Extensive and complex systems are used to direct, convey, or monitor advertising to target audiences of any size and scale.

Advanced Manufacturing & Robotics

Advanced Manufacturing involves smart technology to improve traditional manufacturing of products and/or processes. Robotics is the science and technology of robots, their design, manufacture, and application.

Agriculture Tech (Agtech)

Agriculture Tech captures the use of technology in agriculture, horticulture, and aquaculture with the aim of improving yield, efficiency, and profitability through information monitoring and analysis of weather, pests, and soil and air temperature.

Artificial Intelligence, Big Data & Analytics

AI, Big Data & Analytics refers to an area of technology devoted to extracting meaning from large sets of raw data, e.g. often including simulations of intelligent behavior in computers.

Blockchain

Blockchain is a decentralized data storage method secured by cryptography. Cryptocurrencies are one of many innovations utilizing the blockchain. Companies building their product/architecture on top of this decentralized and encrypted technology are defined as

5. “Patents and the Fourth Industrial Revolution. The inventions behind digital transformation,” December 2017. European Patent Office.

blockchain companies.

Cleantech

Cleantech is comprised of sustainable solutions in the fields of Energy, Water, Transportation, Agriculture, and Manufacturing that including advanced materials, smart grids, water treatment, efficient energy storage, and distributed energy systems.

Consumer Electronics or Home Electronics (includes Wearables, Smart Devices)

Consumer Electronics or Home Electronics are electronic or digital equipment intended for everyday use, including smart devices used for entertainment, communications, and home-office activities as well as other wearables.

Cybersecurity

Cybersecurity is the body of technologies, processes, and practices designed to protect networks, computers, programs, and data from attack, damage, or unauthorized access.

Education Tech (Edtech)

Education Technology refers to an area of technology devoted to the development and application of tools (in-

cluding software, hardware, and processes) intended to redesign traditional products and services in education.

Fintech

Fintech aims to improve existing processes, products, and services in the Financial Services industry (including insurance) via software and modern technology.

Gaming

Gaming involves the development, marketing, and monetization of video games and gambling machines, as well as associated services.

Life Sciences

Life Sciences is the sector concerned with diagnosing, treating, and managing diseases and conditions. This includes startups in Biotech, Pharma, and Medtech (also referred to as medical devices).

Startup Classification Methodology

A foundation of this report is the classification of companies into the Sub-Sectors covered by our research. To build this foundation, we relied heavily on a combination of top-down and bottom-up clustering techniques

and state-of-the-art machine learning algorithms.

In a nutshell, we followed a 4-step approach that led to the classification of companies as it is used throughout this report:

1. Clustering of tens of thousands of companies based on tags provided by our main data partners Crunchbase, Dealroom and Orb Intelligence
2. Identification of clusters of sufficiently large size within the innovation economy
3. Improved labelling of companies based on company descriptions to reduce tagging errors (e.g. tags often included misleading buzzwords)
 - a. Manual labelling of a random selection of 10k+ companies
 - b. Automatic labelling of companies based on frequent and useful tags within each of the clusters
4. Iterative sub-sector classification until our accuracy standards were met (see below for standards)
 - a. Predictive machine learning algorithms based on natural language processing of company description texts provided by our data partners
 - b. Manual review of false positives and false negatives to improve labels for next iteration

This semi-automated and iterative approach allowed us

to move fast while still achieving high accuracy scores. More specifically, we required every predictive model to meet the following criteria:

- Recall⁶, Precision⁷ and F1 Score⁸: 0.85 or higher
- ROC - AUC Score⁹: 0.9 or higher

Additionally, to ensure the high quality of our classification process, we are going to add a manual review process following the 80-20 rule to make sure the largest and most successful companies are accurately classified.

6. Recall: Proportion of actual positive values found by the classifier

7. Precision: Proportion of positive predictions that were indeed positive

8. F1 Score: Harmonic mean between Precision and Recall

9. ROC - AUC: Area under the ROC; score contrasting true positives vs. false positives; from 0.5 (random model) to 1 (perfect model)

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