Partnership for New York City

KEARNEY

The following materials were prepared for the Partnership for New York City to support the post COVID-19 revitalization of our great city

For questions or comments on this material, please contact:

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Kearney’s research and analysis focused on five topics

- Logistics
- Media & Entertainment
- Supply Chain
- Healthcare Innovation
- Digital

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PFNY should support the NY area by promoting initiatives that facilitate Last Mile delivery and reduce congestion

Scope of Highly Impacted Areas:

- **Essential Categories:**
  - Food & Beverage
  - Retail
- **Supply Chain Modes**
  - Store Fulfillment
  - Last Mile
- **Consumption Channels:**
  - Retail
  - Direct to Consumer (DTC)

- **Road transportation is a vital to NYC's economy**, driving 300,000 jobs that service the city's numerous businesses, residents, and visitors
- **Despite declining residency and tourism, an accelerated transition to e-commerce will rapidly grow NYC's road transportation volume** beyond today's 365M tons of cargo that enter, leave, or pass through the city each year (89% of which is delivered by truck and expected by grow 68% through 2045)
- **79% of commercial vehicle activity across Manhattan CBD , Midtown Manhattan Core, FIDI, and Downtown Brooklyn takes place between 7am-7pm** presenting opportunity for extended Off-Hour Delivery (OHD) and alternative delivery methods
- **Commercial road transportation is estimated to account for 30% of NYC's total carbon emissions** presenting a big opportunity for sustainable transportation
- **To continue fueling NYC's vibrant economy,** government officials must invest in:
  - **Extended OHD**: Establish/Enhance programs and incentives which promote OHD across both residential and commercial buildings
  - **Alternative Last Mile delivery strategies**: Incentive shippers and logistics providers to employ sustainable storage/delivery solutions such as cargo-bike delivery, mobile fulfillment centers, shared-use networks and urban DCs
  - **Real-Time Data Sharing and Transparency**: Empower businesses to expedite investment in real-time transportation/delivery visibility though government subsidies and tax-credits

Source: Kearney, NYC DOT, NYC Mayor's Office of Sustainability

NYC's unique environment presents a premier proving ground for how to adapt to rising customer expectations and sustainability imperatives

Key Challenges

Accelerated transition to e-commerce

- **COVID-19** pandemic **grew e-commerce sales** to **17%** of total US retail market
- Supply chains must rapid **evolve** to respond to the **expedited shift to e-commerce**
- NY area has both **greater potential** (customer density is profitable and attractive to startups) and **great constraints** (congestion challenges), so high stakes
- NY area is a **perfect crucible** with demanding and relatively **wealthy customers**

Rising freight volume

- Total **freight tonnage** is expected to **grow** by **68%** to 540M tons by **2045**, **increasing** vehicle **congestion** and **carbon emissions**
- **41%** of New Yorkers **receive home delivery** at least a **few times per week** which will continue **increase** with the **accelerated growth of e-commerce**

High living and operating costs

- Total **employments costs** for private industry workers **increased 2.5% YoY** across the **NY-NJ-CT-PA** metropolitan **region**
- **Higher payroll taxes**, **parking tickets**, **tolls**, and **congestion pricing** produces a **high cost operating environment** for transportation providers

Complex and nuanced Last Mile

- NYC's **population density** of 27,711 people/mi² is the **highest** of any major city within the **Unite States**, yielding a **complex Last Mile** due to increased congestion
- **Geographical nuances** (e.g. residential 'walk-ups', one-way streets, etc.) lead to highly **variable loading/service times**
- NY congestion can be a severe impediment to success
- BOPIS a great model for NY area retail to drive people to stores and to the city

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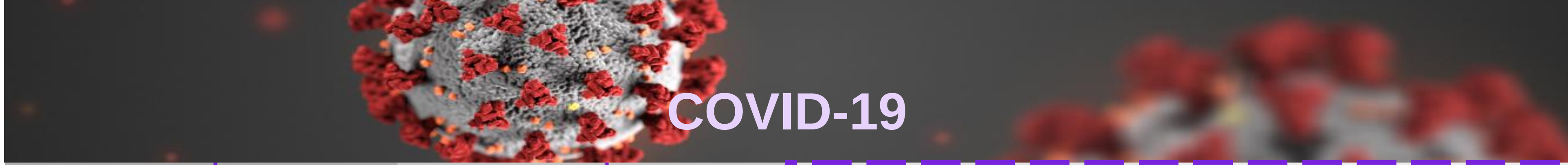
COVID-19 impacts every step of the value chain and NYC is no exception – Retailers and Consumers being at the core of NYC's logistics

Key Challenges



Suppliers

Concerns of supplier network and delivering materials

Situation
- Aware of risk and facing similar situation

Behavior
- Coordinating with supplier network to meet supply agreements

Priorities
- Real time monitoring of inputs
- Daily updates to manufacturers on stock levels, inventory, deliveries, and priorities

Manufacturer

Respond to shifting demand with labor & supply shortages

Situation
- Peaking demand for daily essentials, stopping planned deliveries for others
- Different communications with retailers
- Labor shortages
- Cross-regional bans on transportation for inputs

Behavior
- Adjust workforce schedule and daily tasks for prevention
- Modify demand planning to new work requirements
- Maximize and optimize production of essentials

Priorities
- Safety first
- Meet customer demand
- Delivery to retailers

Retailers

Responding to increased demand & supply shortages

Situation
- Labor shortages
- Risk of cross-regional transportation bans
- Post COVID-19 declines in foot traffic

Behavior
- Change shopping journey to respond to consumer needs, including minimizing transmission risk
- COVID-19 regulations potentially impacting near term transaction volumes

Priorities
- Stocked shelves over negotiated purchasing terms

Consumers

Irregular purchasing behavior fueled by perception of threats

Situation
- Erratic demand of products
- Shifting priorities and frequent updates from customers/retailers
- Awareness of risk, panic and recovery
- Extended time at home
- Accelerated transition to online buying

Behavior
- Stockpiling and panic-buying
- Preference for online retailers over physical stores

Priorities
- Stock of daily essentials, necessities and key pantry and household items
- Communication

In this document we will focus on post-pandemic, as future of NYC will see increases in fulfillment freight and Last Mile activity

Key Challenges

Survive

- How to get organized right away and identify gaps in your plans thus far
- Immediate actions required across the business
- How to stay responsive to the daily changes you will face

Operate

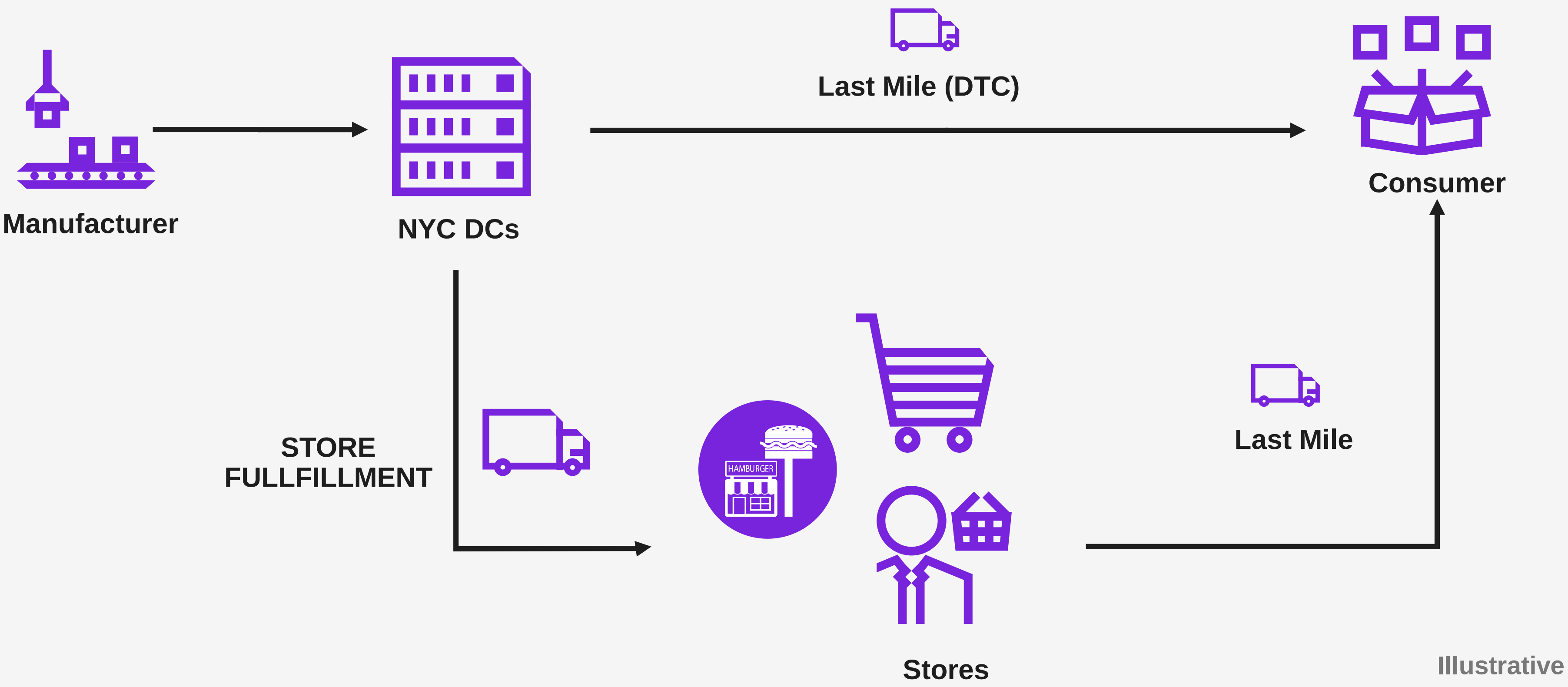
- As things become more certain, how do you operate in the new environment?
- What decisions / tradeoffs do you have to make within the first few months?
- How do you begin to prepare for the next phases of the crisis**?**

Grow

- As new industry dynamics emerge, how can you be successful in the new normal?
- How to learn from this experience, build the lessons into your plans, and prepare for future impactful events?
- **What does the future for NYC's freight distribution and Last Mile look like with:**
  - **E-commerce growth**
  - **Lasting effects of COVID19**

Focus of this document

There are two main contributors commercial NYC traffic: Last Mile deliveries and store fulfillment originating from outside of 5 Boroughs



Approach Scope

Store Fulfillment

– Includes inbound traffic to any inventory holding location within boundaries of NYC, including retail stores, DCs, forward deployment centers, dark stores and retail units
– Typically delivered by 3PLs, shipper assets, and local carriers that operate on ‘milk-run’ principle

Last Mile

– Includes direct to consumer deliveries originating from DCs outside of 5 Boroughs
– Includes direct to consumer deliveries originating from DCs within 5 Boroughs
– Typically delivered by traditional, regional, and local parcel carriers
– Crowdsourcing and Managed Crowdsourcing is becoming a choice of resilience and flexibility, especially after COVID-19

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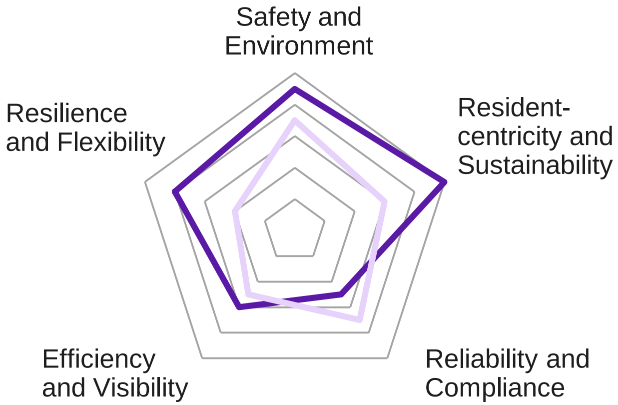
Key questions to consider as you develop a winning Freight and Last Mile delivery strategy in the New York Area's new normal



Approach - Supply Perspective

Safety and Environment

- What **supplies**, **tracking mechanisms** or **technological changes** are required to **keep** workers **safe**?
- What type of **adjustments** are **needed** to **reduce employee touch** or **contamination** exposure?

Resident-centricity and Sustainability

- How do you **pivot** your **delivery network** to successfully **service** a **growing resident population**?
- How do you **minimize carbon footprint** while **supplying** the **city's growing economy**?

Resilience and Flexibility

- What **capacity levers** are needed to **quickly respond** to **unplanned** environmental **change**?
- How do you **design** your **delivery network** to **mitigate** operational **risk**?

Efficiency and Visibility

- What **strategies** or **technologies** can you implement to **improve** operational **efficiency?**
- What actions are needed to **minimize cost headwinds** with **growing home delivery** volume?

Reliability and Compliance

- How do you **design** your **network** to repeatedly achieve **on-time delivery rates**?
- How do you **minimize** delivery **defects** which diminish **customer trust**?

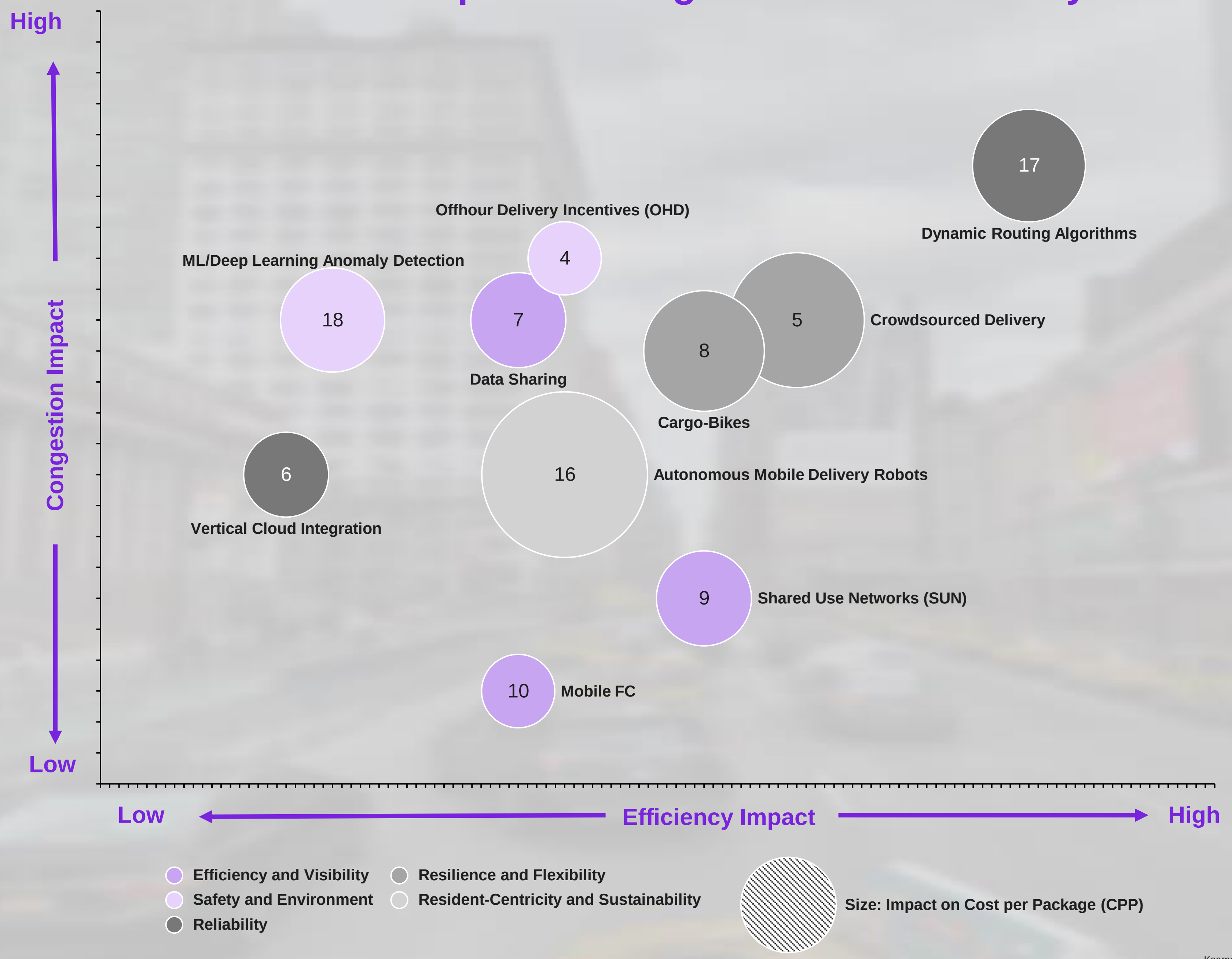
Proposed Solutions

	Restart / Reenergize (Do Now)	Invest / Grow (2-5 years)
Safety and Environment	1. Personal protective equipment and supplies 2. Mobile applications to proactively track employee health status 3. Mandatory health and safety training for all workers 4. Extended OHD to reduce VMT	14. Autonomous vehicles to reduce accident rates 15. Enhanced zoning restrictions to regulate commercial traffic 16. Robotic delivery vehicles to execute final 50 ft, reducing human-to-human contact
Resilience and Flexibility	5. Crowdsourced delivery to manage intra-day and intra-week delivery demand variability 6. Vertical cloud integration to enhance real-time transportation visibility 7. Data sharing and transparency to proactively adapt to change	17. Dynamic routing algorithms using graph databases and ML to predict and automatically adapt to environmental change 18. Real-time, automated anomaly forecasting and resolution systems using ML and neural networks
Resident-centricity and Sustainability	4. Incentivize OHD to minimize congestion and carbon missions (e.g. Shipper of Choice) 8. Cargo-bikes, 'walker' deliveries, and EVs to decrease congestion, and enable carbon neutrality 9. Shared Use Networks (SUN) to reduce carbon emissions and congestion	19. Governmental mandate for 100% carbon neutral transportation systems 20. Drone delivery for ultra-fast small parcel to reduce road congestion 21. Vertical Micro-Fulfillment Centers (MFC) to position inventory closer to customers, limiting road transportation and congestion
Efficiency and Visibility	10. Zone-based delivery strategies, SUN, and mobile fulfillment centers to increase route density and reduce Last Mile delivery costs 6. Vertical cloud integration to enhance real-time transportation visibility and minimize final 50 ft complexity 11. Alternative delivery options (e.g. store pickup, lockers) to minimize service time variability	17. Dynamic routing algorithms using graph databases and ML to predict and automatically adapt to environmental change 16. Autonomous mobile delivery robots using dynamic algorithms and deep learning to minimize final 50 ft variability 22. Real time track and trace, Real time optimization
Reliability and Compliance	12. Real-time exception management to proactively address identified delivery defects or anomalies 13. Network design optimization to ensure repeatable KPI achievement 6. Vertical cloud integration to enable real-time performance tracking	17. Dynamic routing algorithms using graph databases and ML to predict and automatically adapt to environmental change 18. Real-time, automated anomaly forecasting and resolution systems using ML and neural networks 23. Urban DC/Warehousing

Impact: plotting various solutions showcases varying effect on congestion and efficiency

Approach - Illustrative

Solution Impact to Congestion and Efficiency



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Shared Use Network
Establish programs which incentivize shippers and logistics providers to collaborate and reduce city congestion and carbon emissions

What is it

- Recent volatility has created capacity shortages and surpluses in the asset bases of shippers
- Shared Use Networks are a trend among shippers who want to share the fixed cost of their networks while increasing capability, flexibility and resiliency
- Duplicative networks build costly pipelines into the same markets – think of how many hundreds of supply chains are built to supply NYC's robust economy

Who needs it

- Cities which are seeking to reduce VMT, congestion, and carbon footprint
- Shippers with sub-scale distribution capabilities or growing needs in context of reaching consumers with a shorter lead time
- Asset-owners with excess distribution capabilities that could be monetized by sharing them with the right partners

Summary

Challenge

- Instituting the right initiative which encourages business to work together and integrate distribution networks
- Providing a centralized platform to facilitate the matching of compatible partners across needs of flexibility, cost, and capability

Approach

- Kearney teams conduct Fleet and DC modeling to understand available capacity and the synergies created by adding additional shippers' volumes into a network
- Kearney teams model networks using digital twins to determine the right level of integration and the advantages created

Benefits

- Kearney's clients have identified opportunities to reduce operating expenses by 15-20% with additional synergies such as cross-selling and G&A overhead reduction

Impact

Decongestion

Efficiency

Sustainability

Shipper of Choice
Establish programs and incentives for Shippers of Choice

What is it

An incentive and recognition program for:

- Shippers that are highly compliant with regulations and take the lead in innovating solutions
- Shippers with highest OHD scores
- Shippers with highest sustainability impact
- Most decongestant shippers (Deliver Hours Per Package)

Who needs it

- Most shippers, who seek to benefit incentives and recognition from NYC
- NYC

Summary

Challenge

- One of the biggest contributors to NYC traffic is commercial activity during peak hours. The resources such as curb space, loading docks and temporary parking availability presents challenges to transportation activity within 5 boroughs

Approach

- Outline a program that will award the “shippers of Choice”
- Understand and quantify KPIs to implement in the program
- Execute KPI tracking methodologies and data visibility
- Increase attractiveness to shippers by incentivizing and recognizing Shippers of Choice

Benefits

- Special traffic permits or subsidies or credits
- Recognition by NYC
- Credits for carbon footprint offset

Impact

Cost

Decongestion

Efficiency

Sustainability

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Overview

The **Media and Entertainment industry** (incl. TV, film, theater, music, sports, digital publishing, print, advertising and public relations) in the Greater New York metropolitan region **employed 363K people** in September 2019, with total annualized **wages of ~$43.7B**

A study published by the NYC Comptroller's office found that the creative economy (which includes Media and Entertainment industries mentioned above plus museums, art galleries, and fashion, and excludes sports) generated $110B in economic activity in NYC (1/8 of total economic activity)

The media industry faces tremendous headwinds caused by COVID-19 and the associated shutdowns – the damage will be felt most acutely by the 36% of creative workers who are self employed, and thus have limited access to health and unemployment insurance

Media leaders are envisioning a three phase evolution of the COVID-19 impact on their businesses: **1) Crisis Response, 2) Interim Management, and 3) Steady-state Future**. We are currently entering the interim management phase, where businesses will have to adapt to significant disruptions including: reduced tourism and attendance at live events, a continued shift towards digital channels, and lower levels of discretionary spending

The greater New York community can assist the Media and Entertainment industry by supporting companies as they develop new economic models to weather the downturn until we reach a steady-state future

Source: Kearney; BLS; NYC Comptroller's Office: The Creative Economy;

Media and Entertainment impact on NYC Metro region

Overall NYC Media and Entertainment Industry – Key Facts

Employees: 363K
Wages: $43.7B
Economic impact: $110B[1]

Relevant statistics/trends:

- NYC is home to more $2B+ revenue media companies than any other city globally
- 36% of NYC's creative economy workforce is self-employed (compared to 10% of overall workforce)

1. Economic impact based on creative economy output which also includes museums / art galleries and fashion and excludes spectator sports. Employment is based on BLS statistics for NY Metro region.

Source: Kearney; BLS; GoCompare;.com; Broadway League; New York Times; NYCEDC; NYC Comptroller's Office

Media and Entertainment selected sub-industry impact on NYC Metro region

Media/Entertainment Sectors – Key Facts[1]

TV / Film

Employees: 82K
Wages: $9.4B
Economic impact: N/A

Relevant stat/trends:
- From 1998-2017 Manhattan had the most movies filmed on-location of any city in the world; Brooklyn and Queens are also in the top 5
- 19% of US TV/Film jobs are in NYS

Theater

Employees: 18K
Wages: $1.0B
Economic impact: $16.0B

Relevant stat/trends:
- Broadway show admissions reached 14.8M in the 2018-2019 season, a record high
- Non-Caucasian attendance reached a record high of 3.8M

Music

Employees: 10K
Wages: $1.2B
Economic impact: $21B

Relevant stat/trends:
- 5.4 million tickets sold annually at major music events (most globally)
- 70+ startups involved in digital music services (most globally)

Sports

Employees: 3K
Wages: $0.7M
Economic impact: $0.7B (excl. athlete salaries)

Relevant stat/trends:
- NYC is one of only two major metropolitan areas with more than one team in each of the four most popular professional sports leagues

Advertising and PR

Employees: 121K
Wages: $14.4B
Economic impact: N/A

Relevant stat/trends:
- 22% of US advertising jobs are in NYC
- 27% increase in advertising jobs from 2008-2017

Digital & Print Media / Publishing / News

Employees: 116K
Wages: $15.6B
Economic impact: N/A

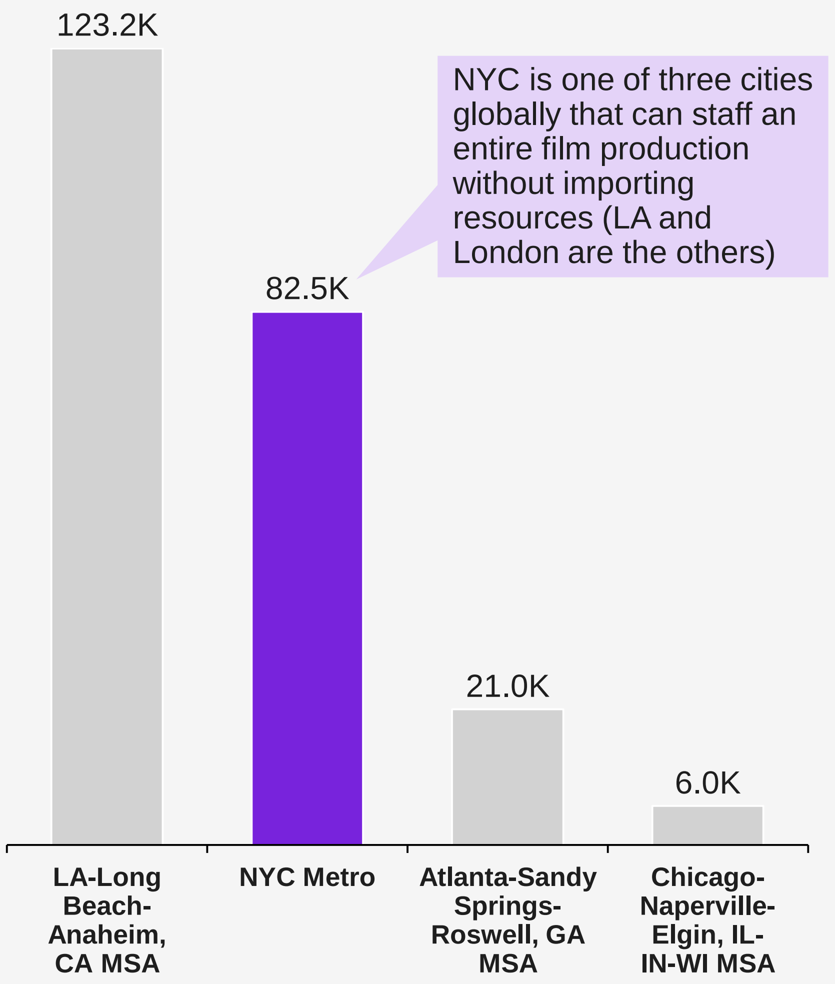
Relevant stat/trends:
- 19% of US publishing jobs are in NYC

1. Sub-industry categories excludes agents, independent artists/writers/performers, and commercial photographers. Economic impacts pulled from variety of reports on economic impact of different industries in NYC.

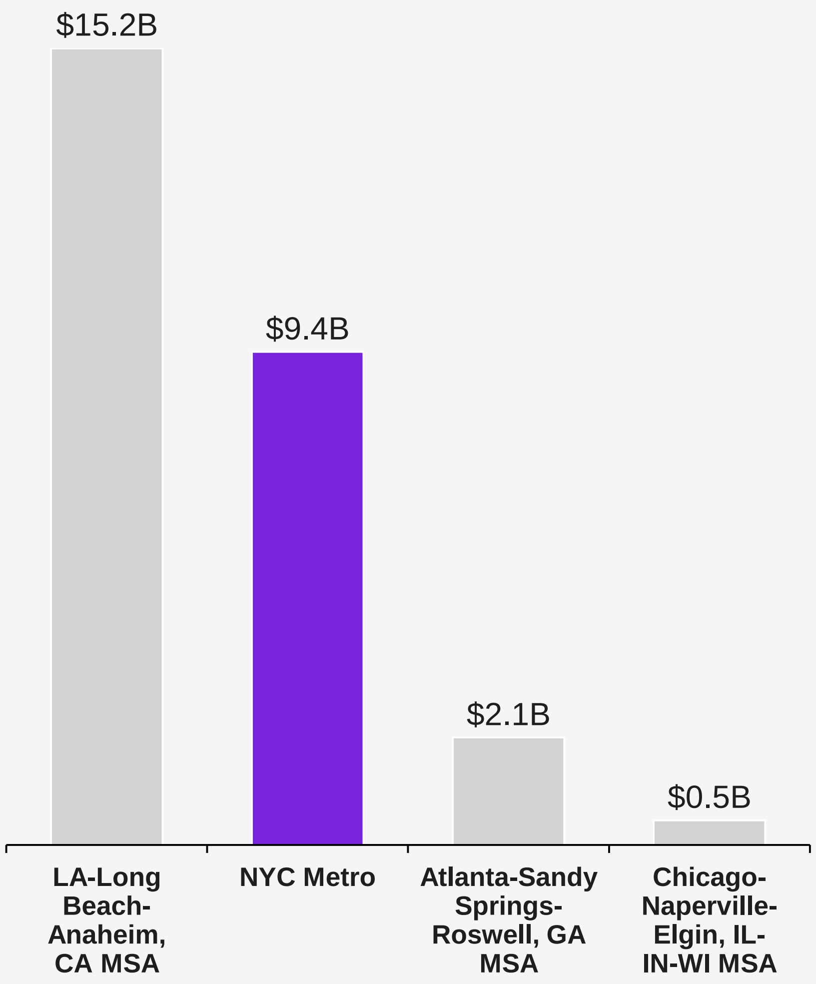
Source: Kearney; BLS; GoCompare;.com; Broadway League; New York Times; NYCEDC; NYC Comptroller's Office

NYC has the second largest TV/Film industry in the US

TV/Film # of Employees (2019)[1]



TV/Film Annualized Wages (2019)[2]



1. Based on September 2019
2. Based on Q3 2019 * 4

Source: Kearney; BLS

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The Media and Entertainment industry is a big driver of tourism and talent attraction for NYC

Positive externalities of the Media and Entertainment industry

General entertainment

– Tourists' recreation and entertainment spend totaled $5.5B in 2019

– NYC has 8% of the US' creative industry employees (second only to LA)

TV / Film

– Live TV filming is estimated to generate $45M in tourism spend each year in NYC

Theater

– 65% of Broadway show attendees are tourists (19% from outside the US)

Music

– 5M tickets are sold to music events each year, with an estimated 10-25% of attendees from outside the tri-state area, leading to $400-500M in overall tourism spend

Sports

– In 2019, more than 4M visitors attended a sporting event in NYC

Source: Kearney; Wall Street Journal; Leichtman Research Group; Broadway League; Sonic Bids; NBC News; Pollstar; Expert interviews

Some Media and Entertainment sub-industries have a serious risk of COVID related declines

Organizations most at risk of COVID related declines

TV / Film

– Production in NYC is shut down and will likely remain so until there is a vaccine in place and social distancing requirements are removed

– Sports affiliate networks (e.g., YES, MSG), will struggle greatly in the short-term so long as live sports are cancelled

– Linear advertising spend is declining due to clients financial struggles from COVID as well as a shift in consumer attention towards digital platforms

  – Ad buyers estimate that $1.0-$1.5B in linear advertising commitments could be cancelled in Q3

  – Long-term reduction of 20-30% in linear advertising will impact broadcast companies as well as the creative community around these types of advertisements

Live attendance events (cinema, theater, concerts, sports games)

– Currently, spectator events are prohibited in NYC

  – Attendance likely to remain low until there is a vaccine in place and social distancing requirements are removed

Print media companies

– Increased shift towards digital further reduces demand for printed media, particularly as concerns over the virus spreading from contact persist

Out of home advertising

– Out of home advertising will have reduced demand so long as stay-at-home orders (or recommendations) are in place, particularly in major foot traffic areas (e.g., Times Square)

Source: Kearney; Wall Street Journal; Leichtman Research Group; Broadway League; Sonic Bids; NBC News; Pollstar; Expert interviews

Executives see three phases to the COVID recovery

Phases of COVID recovery – Thoughts From Interviews of Industry Stakeholders

As businesses think about their multi-year horizon, many industry leaders envision **three distinct phases in the COVID recovery:**

1 Crisis response

As widespread quarantine and social distancing requirements are implemented, how do we adapt our operations?

March - May

2 Interim management

With the immediate shock of the crisis behind us and limited openings underway, how do we weather ongoing consumer anxiety and reduced discretionary spending to survive long enough to reach a more steady state future?

June – YE ???

Primary focus of interviews

3 Steady-state future

When vaccines, herd immunity, and/or effective contract tracing are in place, what do we want our long-term operating model to look like?

2021-2022 ??

Most industry leaders are **focusing on interim management**. No one knows how long this will last, but it is clearly going to be a **fight for survival**

To survive, companies will need to rethink their operating models and **identify new revenue streams to bring gross profits as close to fixed costs as possible**

Source: Kearney interviews with 40+ median and entertainment industry executives, employees and freelancers, May 2020

NYC must help companies solve for the interim management stage between crisis response and our steady state future

1 Crisis response → 2 Interim management → 3 Steady-state future

Possible solutions to survive the interim management phase – Purely Speculative

Within NYC's Media and Entertainment industry, industry stakeholders have mentioned a few ways for sub-industries to adapt in the interim:

- **TV/Film:** **Revise NYS tax credit incentive programs** to focus less on location shooting and more on **post-production activities** (e.g., editing) and **production support activities** (e.g., set design, costumes) until live production is safe to return to NYC/NYS
- **Theater: Adapt shows** to limit social interactions between actors, orchestra, and crew and **produce streaming offerings** for mass consumption and/or **limited in-person viewings** at higher cost per ticket. Offer ancillary services such as **live or digital meet and greets with cast members**
- **Advertising:** Continue **supporting NYC startups** in the digital space to **shift the concentration of media innovation** (e.g., AR/VR, gaming) from Silicon Valley to NYC
- **News:** A NY news provider (e.g., NYT, NYP) could create **premium subscription** with special **NY-centric interactive podcasts** structured around the newspaper's sections. **Exclusive interviews** could include the chance to "meet" leaders from New York's sports, arts, literature, business, and political industries

These interim management solutions may or may not continue into the longer-term "steady state future" , but could serve as a bridge to that future

A number of pre-COVID trends are accelerating in the Media and Entertainment industry that will define steady-state future (1/3)

1 Crisis response → 2 Interim management → 3 Steady-state future

Industry Trends Affecting the Post-crisis “Steady State Future”

TV cord cutting:

- Pre-COVID: Cord-cutting a continuing trend, with the largest cable and satellite pay-TV providers in the US losing 3.2M subscribers in 2018 and 5.5M subscribers in 2019. COVID has accelerated recent declines to double this.
- Long-term steady state: In the first quarter of 2020, the largest pay-TV providers in the US lost more than two million customers, the sharpest quarterly decline on record. While the decline will not be this steep in the long-term, there will continue to be falling numbers of subscribers
  - With decreasing numbers of subscribers and rising fees per subscriber, the economic model for pay-TV will need to reset, ultimately resulting in a 25-30% decline in basic cable affiliate fees
  - Additionally, with the rise in SVOD platforms, demand for content will remain high, continuing to shift the balance of power towards content creators. >40% increase in streaming demand in two months

Movie releases

- Pre-COVID: Studios have been exploring alternative release strategies outside of standard theatrical release windows, but have faced pushback from major theater chains
- Long-term steady state: The success of *Trolls World Tour in a DTC* release showed that a large budget film could perform without theatrical revenue. Given the ~50% rev share in theatrical vs. ~80% share in direct to home, this may drastically impact release strategies for non-spectical features.

Source: Kearney; Wall Street Journal; Leichtman Research Group; Broadway League; Sonic Bids; NBC News; Pollstar; Expert interviews

A number of pre-COVID trends are accelerating in the Media and Entertainment industry that will define steady-state future (2/3)

1 Crisis response → 2 Interim management → **3 Steady-state future**

Industry Trends Affecting the Post-crisis “Steady State Future” (Continued)

Theater

- Pre-COVID: Broadway’s revenue and attendance has increased every year since the 2011-2012 season, driven by rising tourism every year for the past 10 years – 65% of Broadway show admissions in the 2018-2019 season were by tourists
- Long-term steady state: Broadway’s shutdown through summer 2020 will have immediate impacts, but longer term COVID related decline in tourism and consumer concerns over social gatherings will lead to a reduced number of shows and a long road to recovery. Once we reach steady-state, there should be a return to pre-COVID levels of activity.

Music

- Pre-COVID: Alternative revenue streams from touring, merchandise sales, and licensing rising as revenues from albums and streaming services remain low
- Long-term steady state: Coronavirus could cost the live show industry $9B in lost revenues for 2020 (~75% of total projected for the year), and the recovery will be slow, requiring artists to find new ways to monetize themselves. Ancillary revenue streams developed during the intermittent management phase should
- Product release trending toward social media (tiktok soundtrack bidding increasing rising rapidly)

Source: Kearney; Wall Street Journal; Leichtman Research Group; Broadway League; Sonic Bids; NBC News; Pollstar; Expert interviews

A number of pre-COVID trends are accelerating in the Media and Entertainment industry that will define steady-state future (3/3)

Industry Trends Affecting the Post-crisis "Steady State Future" (Continued)

Advertising

- Pre-COVID: Ongoing shift from print advertising to digital, largely due to stronger targeting and conversion tracking capabilities
- Trend toward niche content away from tentpole features and episodic television will disintermediate mainstream advertisement. Focus will be on hyper niche and native ads backed by evidence of interaction (e.g. social media) not just eye balls. Strong shift toward gaming where community and segmentation is robust (75% traffic growth since quarantine)
- Long-term steady state: As consumers' digital engagement rises during quarantine, there is a greater shift towards digital that will stick as consumer habits are forever changed. Ad buyers estimate that $1.0-$1.5B in linear advertising commitments could be cancelled in Q3; while this is in the short term, we believe reductions in linear advertising will ultimately decline 20-30% in the steady state
  - Along with the greater emphasis on digital advertising, there will be a shift towards programmatic buying across digital advertising, driving a rise in those roles in NY and a decrease in roles dedicated to traditional media buying and selling

Source: Kearney; Wall Street Journal; Leichtman Research Group; Broadway League; Sonic Bids; NBC News; Pollstar; Expert interviews

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Reduced tourism and increased work from home are the largest disruptors, while manufacturing has potential to benefit from increased localization of essential supplies

Industry	*GDP Share*	*Employment Share*	*Big Disruptors*	*Potential Impact*	
				NYC	*NY Metro*
Healthcare	8%	16%	– Increased need for locally sourced medical supplies boosts healthcare manufacturing	◕	◑
Real Estate	16%	2%	– Increased work from home & cost pressures will reduce commercial real estate footprint – As more people look to save money, residential buying will fall off	●	◑
Retail Trade	5%	9%	– Impact of reduced tourism will result in closed brick and mortar stores (up to 20%) – eCommerce will double	●	◑
Manufacturing	5%	4%	– With increase need for localization of essential supplies, manufacturing is set for a boost given right incentives	◕	◕
Accommodation & Food Services	2%	7%	– With tourism 25% decline, accommodation & food services will be the biggest losers	●	◕
Transportation & Warehousing	2%	4%	– Expansion of eCommerce will increase delivery related transportation with a need to repurpose warehousing to meet ecommerce demands	●	◑
Finance and Insurance	13%	6%	– Increase in work from home will broaden the talent pool beyond NYC and reduce need for commercial real estate	◔	◔
Professional Services	10%	8%	– Increase in work from home will broaden the talent pool beyond NYC and reduce need for commercial real estate	◔	◔
Information	9%	3%	– Increased work from home will increase need for information tools	◕	◑
Government	9%	13%	– As tourism falls, and work from home increases, public transit revenues will take a decline – Increased eCommerce will drive traffic and congestion leading to higher govt. expenses	◑	◑
Wholesale Trade	6%	4%	– With demand falling because of reduced tourism, wholesale trade will take a significant hit	◑	◑
Construction	3%	6%	– As commercial and residential real estate demand falls, and government revenues shrink, both public and private construction will fall – Reshoring of sourced building materials given tariffs and localization trends	◕	◔
Admin and Support	3%	4%	– Shifting jobs to work from home will impact source of talent, broadening hiring pool	◔	◔
Mgmt of Companies	3%	5%	– Reduced demand for corporate space could impact commercial real estate	◑	◔

Low Impact ○ – ● High Impact

- **Essential Categories:**
  - Medical supplies
  - Real Estate
  - Brick and mortar retail
  - Manufacturing
  - Food and beverage
  - Transportation & Warehousing
- **Key Takeaways:**
  - NYC will see the most significant disruption in SC due to declining tourism
  - Imports of essential items will need to be replaced with localized manufacturing
  - Last mile delivery will go up significantly due to increase in home deliveries
  - Brick and mortar retail will go down by up to 20% due to lower tourism and increased work from home

Impacted Industries

How to Operate NYC Supply Chain in the "New Normal"

Scope of Highly Impacted Areas:

- **Essential Categories:**
  - Food & Beverage
  - Medical and Cleaning Supplies
  - Building Materials
- **Supply Chain Modes**
  - Last Mile
  - Intermodal
  - Imports
- **Consumption Channels:**
  - B&M – Small (e.g., convenience)
  - B&M - Large (e.g., Mass, Grocery)
  - Pharmacy
  - eCommerce
  - Institutions

	Key Challenges	Recommendations: Operating NYC in "New Normal" – *Private*	Recommendations: Operating NYC in "New Normal" – *Public*
Demand	**15 – 25% drop in consumption due to decline in tourism and daily commuters** • **Channel Shift:** Step change increase of eCommerce / omnichannel as preferred consumer channel (overall 2X increase) with increased consumption • **Category Priorities:** Increased demand for essentials and shift to "no-frills" mentality • **Increased Need for Assistance:** Food insecurity expected to double	**1 Increase disposable income** • Relax deposit restriction for residential renters • Offer flexible payment terms on products and services **2 Ease consumer fear and anxiety:** • Implement safety measures (e.g., policies, infrastructure) to provide comfort for consumers to visit social establishments, including increased automation • Provide insurance style guarantees on events	**3 Incentivize consumer spend** • Develop tax incentives or subsidies for tourism (hotel, airline, rail) • Evaluate regulations on impacted industries (e.g., outdoor dining, alcohol delivery) **4 Ensure daily commuters return** • Subsidize resident and day commuter needs (e.g., transportation, real estate) **5 Increase income** • Offer stipend/guaranteed income
Supply	**35% drop in make capacity and reliance on imports for essentials with a surplus of retail and hospitality workers** • **Supply Risk:** Reliance on highly taxed imports puts essential supplies SC at risk • **Excess labor:** 20% of NY workforce is in industries expected to decline post-pandemic, which will require a pivot in skills • **Reduced Productivity:** Updated safety measures lower production capacity	**6 Localize manufacturing and sourcing** • Identify tri-state area suppliers and contract mfg. for critical supplies • Consolidate at risk industries (e.g., farms and/or food processors) **7 Increase DC capacity and automate manual activities** • Increase eCommerce distribution capability for channel shift at: – 6 NYC food and beverage DCs – Company DCs, 3PLs, etc. • Develop automation to improve capacity and reduce crowding	**8 Incentivize local make & source** • Drive supply chain localization and essential product production (e.g., quotas, tax breaks) • Provide loans or grants to critical local business (e.g., food processors, farmers, distributors) • Spur automation innovation through subsidies or investment **9 Develop programs to retrain workers** • Retrain leisure and hospitality workforce in new skills
Infrastructure	**Increased strain on NYC infrastructure** • **Shift in mode:** Estimated that 20% of physical stores will close while ecommerce will double, further increasing traffic burden	**10 Improve community features** • Improve use of real estate with shared spaces (e.g., parks, playgrounds)	**11 Adapt to demand change impacts** • Increase sanitation capacity for incremental parcel waste • Evaluate traffic flows, incl. expansion of off-hours delivery & delivery lanes

Significant declines in tourism, increased work from home coupled with consumer focus on saving and social distancing will have significant impact on New York's supply chain

New York Should Brace for a Protracted Recovery and 'New Normal'"

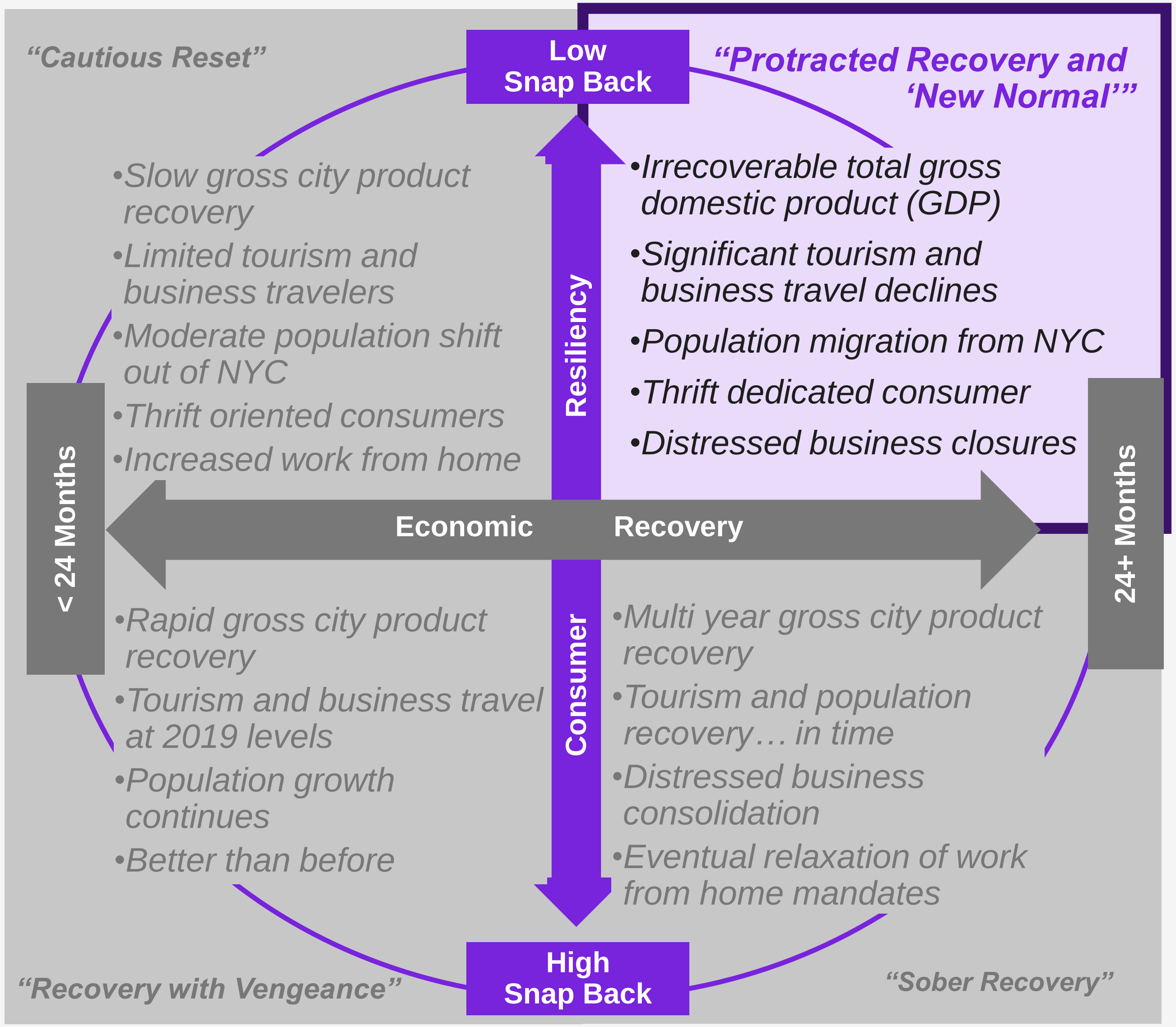
Focal question

What actions are required now to survive and thrive after COVID19? ?

Forces Shaping the Future NYC Economy

– Rapid global economic contraction
– Uncertain timing of vaccine discovery and administration
– Consumer reluctance to take unnecessary health risks

Competing Visions of the Future – A Framework



Kearney XX/ID

Key Challenge: 15 – 25% drop in consumption due to decline in tourism and daily commuters

DEMAND IMPACT

How will city consumption be impacted?

Tourism[1]

25%

Current annual visitors: 65M
Expected decline in tourism visits, which is 9x worse than post September 11th

Population[2]

TBD

Pop. Δ	Post 9/11	'08–09
NY County	0.4%	(2.6%)
NY State	0.3%	1.0%

Daily Commuters[3]

10%

Estimated reduction in office work, decreasing daily population

Social Events Attendance[4]

72%

Portion of Americans willing to attend sporting events

Where will consumers consume?

2X

eCommerce increased from 20% **to 40%** with a step change in use by **new consumers** (e.g. older demographic) and in **new categories** (e.g. groceries)

20%

Physical stores will shut down, & the shift of the role of stores will accelerate

What type of goods will consumers purchase?

– **Consumers will seek** brands that display real expertise, **'no-frills', unprejudiced patriotism and social care**
– Prioritization of **safety and security will continue** post-crisis
– **Consumer values** will have shifted to focus on the **'essential'**
– Brands perceived **"wasteful" will suffer** (e.g. fast fashion) – Cardboard used for packages annually in US would equate to 1 Billion Trees[6]

Key Challenges

15 - 25% Decline in Consumption
- 6% decline in restaurants
- 5% decline in retail
- 72% decline in consumption related to events

Doubling of eCommerce
- Share of eCommerce spend to go from 20% to 40% causing brick and mortar store closures
- Consumers rated safety and contributions to society as the most important brand trait

Increased strain on NYC infrastructure
- 4 – 8% uptick in traffic driven by delivery vehicles
- 2X shipping waste (1.5 million packages going to 3 million per day in NYC)

Kearney XX/ID

Source: Kearney analysis : 1. UN Tourism; 2. St. Louis FED, 3. Atlantic; 4. Seton Hall study, 5. Datassential survey of 1,000 US Consumers, April 17-20. 6. FASTCOMPANY

Key Challenge: 35% drop in make capacity and reliance on imports for essentials with a surplus of retail and hospitality workers

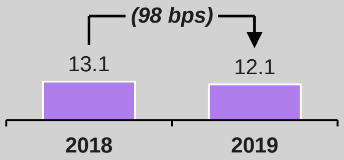
SUPPLY IMPACT

What will be the impact on supply?

Production Capacity

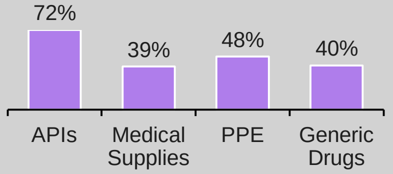
Updated safety measures lower production capacity of meat products

Reshoring Index[1]



Trade wars coupled with COVID-19 reversed trend in offshore production

Imports of Essential Items[3]



During shutdown, China exports to US for such supplies fell 20%, 50 countries have embargoed export of medical supplies

New York Employment

NY Employees (000s)	January 2020	Post 9/11 Δ	08–09 Δ
Retail Trade	916	(1.2%)	(2.2%)
Leisure and Hospitality	960	0.5%	2.5%
Total	9,785	(1.5%)	(2.5%)

Greater impact on tourism compared to post 9/11 will likely reverse employment outcome in leisure

How will the consumption channels be impacted?

No. of US Outlets (000s)[2]

Restaurant Type	Pre-Pandemic	Post-Pandemic	Difference
Chain	219	197	(15%)
Independent	464	344	(85%)
Total	683	541	(20%)

Voice of Restaurant Owner[2]

- 19% nervous they will not come back to business
- 41% seek advice on To-Go / Delivery enablement
- 86% Take-out sales will not offset dine-in loss

Channel Shift[2]

- Doubling of ecommerce will put a strain on NYC traffic
- 6 NYC DCs will have to adapt capacity for increased in-home delivery

Consumer Trends

- 72%[4] will not attend social events (sports) until a vaccine is found
- Customer trips to stores will go down, with increased focus on one-stop-shops

Key Challenges

Reliance on imports puts essential supplies SC at risk

Updated safety measures **lower production capacity by up to 35%**

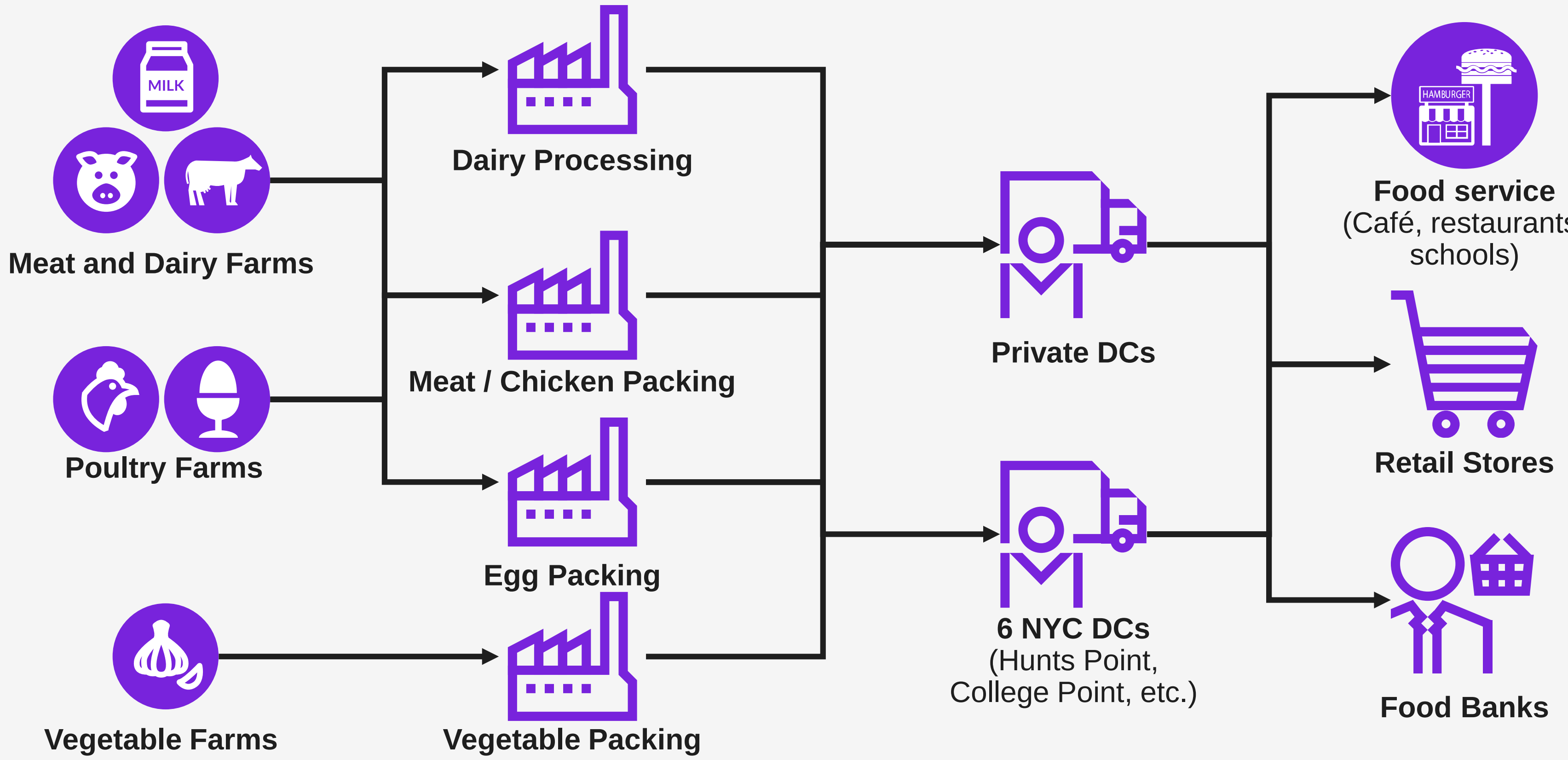
~20% of NY workforce is in industries expected to decline post-pandemic, which will require a pivot in skills

Estimated 20% of physical stores will close while ecommerce will double, further increasing burden on NYC traffic

Source: Kearney Analysis; 1. Reshoring Index compares US manufacturing gross output to import data from 14 Asian low-cost countries (LCCs); 2. Kearney Analysis; 3. FDA; 4. Seton Hall study
National Restaurant Association, Reuters, Euromonitor, CHD Expert, Rabobank, UBS, Technomic's Top 250 Chain Restaurant Report

Break in food supply chain is causing farmers to destroy their produce while grocers and food banks struggle to keep up demand

Illustrative – Food Supply Chain NYC



Short Term	– Food service shutdown coupled with plant slow down / shutdown forcing **farmers to destroy produce**	– Active **shift towards retail packaging** while plants struggle with illness related **shutdowns / slowdowns**	– Fears of drivers refusing to travel to pandemic hotspots	– Retailers struggle to keep up with increased demand, with **supply shortages in low income areas** – **More people turn to food banks / pantries**
Post Pandemic	– **Reduced demand overall for many items due to reduced demand for food service items** (onions, cheese, etc.) – **Farmers may be forced to destroy further produce** – Continued product waste (i.e. destruction) will reduce cash flow, straining supply	– **Shift in demand towards staples consumed at home** – **Reduced capacity / increased automation** as manufacturers manage social distancing – **Shift in capacity** towards retail products and packaging	– **Demand at DCs will be lower overall** – **Shift in capabilities / increased capacity will be needed to** manage different packaging needs and increased demand for e-commerce / in home delivery	– **Food services demand will remain low** due to reduced tourism and increased WFH – **Demand at retail channels will increase** as more people WFH and avoid restaurants – **ecommerce will increase** – **More people turn to food banks / pantries**

Kearney XX/ID

We see five trends that drive no regrets decisions to improve supply chain resiliency

No Regrets Moves

Indexing matches executive summary

Demand	2		**Ease consumer fear and anxiety through enhanced safety measures and policies**	• Implement safety measures (e.g., policies, infrastructure) to provide comfort for consumers to visit social establishments, including increased automation
	3		**Incentivize consumer spend through public policy**	• Develop tax incentives or subsidies for tourism (hotel, airline, rail) • Evaluate regulations on impacted industries (e.g., outdoor dining, alcohol delivery)
Supply	7		**Increase DC capacity and automate manual activities**	• Increase eCommerce distribution capability for channel shift at: – 6 NYC food and beverage DCs – Company DCs, 3PLs, etc. • Develop automation to improve capacity and reduce crowding
	8		**Incentivize local make and source through public investment**	• Drive supply chain localization and essential product production (e.g., quotas, tax breaks) • Provide loans or grants to critical local business (e.g., food processors) • Spur automation innovation through subsidies or investment
Infrastructure	11		**Adapt to demand change impacts with supporting public infrastructure**	• Increase sanitation capacity for incremental parcel waste • Evaluate traffic flows, including expansion of off-hours delivery & delivery lanes

Kearney XX/ID

Recommendations: Operating NYC in "New Normal"

Indexing matches executive summary

Restart / Re-energize: What activities & strategies should continue & be accelerated?

Invest and Grow: What activities & strategies should start or stop?

		Private	Public
Demand	Restart / Re-Energize	1. Relax deposit restriction for residential renters 1. Offer flexible payment terms on products and services 2. Provide insurance style incentives (e.g., guarantees on events occurring in light of COVID) 2. Implement safety measures (e.g., policies, infrastructure) to provide comfort for consumers to visit social establishments	3. Provide subsidies for airline and/or rail tickets to NYC to encourage tourism 3. Relax outdoor dining restrictions 3. Adjust delivery restrictions on alcoholic beverages 3. Reduce city occupancy taxes for hotels to encourage tourism 3. Subsidize/sponsor restaurant weeks 3. Evaluate real estate tax rates for residents and landlords 4. Subsidize day commuter needs to spur demand related to working from office
Demand	Invest and Grow		4. Provide long-term tax incentives to businesses for occupied commercial real estate 5. Provide stipend/minimum guaranteed income to low income households
Supply	Restart / Re-Energize	6. Identify tri-state area suppliers and contract manufacturers for critical supplies to shorten supply chain 6. Consolidate farms and/or food processors and improve overhead cost efficiency 6. Repackage goods for channel specific needs due to shift in demand (e.g., restaurant vs grocery) – Monitor supplier health and secure alternate sources	8. Create tax incentive plan for companies that reshore manufacturing (e.g., boat building, chemicals) 8. Develop quota for domestic vs. imported products 8. Create local infrastructure to rapidly produce essential items (e.g., building materials, vaccines) 8. Incentivize manufacturers to produce high demand goods with tax breaks 8. Identify local suppliers to produce essential medical supplies
Supply	Invest and Grow	6. Form private and public partnerships between processors and distributors to shift excess capacity towards food banks, NYC institutions 6. Reallocate supply across channels by working with upstream production (e.g., brick and mortar vs. eCommerce) 7. Increase eCommerce distribution capability for channel shift at: – 6 NYC food and beverage DCs – Company DCs, 3PLs, etc. 7. Develop automation/robotics to cope with restrictions on labor that impacts capacity	8. Develop digital platform and data sharing to create transparency in essential supplies and food availability 8. Create plans to repurpose capacity across facilities to support public need for medical supplies (e.g., Active Pharmaceutical Ingredients, PPE) 8. Collaborate with private industry to repurpose real estate 8. Spur innovation of automation technology through subsidies, tax breaks or direct investment – Provide loans or grants to food processors, farmers and distributors to ensure cash strapped farm industry doesn't spur a food crisis 9. Retrain leisure and hospitality workforce in manufacturing to help with reshoring and localization
Infrastructure	Restart / Re-Energize	10. Improve use of real estate with shared spaces (e.g., parks, playgrounds)	11. Increase NYC sanitation capacity based on incremental waste impact due to shift to small parcel from bulk packaging 11. Evaluate traffic flows, including expansion of off-hours delivery program, consideration of alternative delivery vehicles (e.g., cargo bicycles, UPS truck trikes)

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Healthcare is a critical sector for NYC's economy

Economic Engine for NYC

– **Healthcare** sector accounts for **8%** of **GDP** and **16%** of **employment** in NYC

– **Fastest growing sector** (3%) after Tech and **fastest growing employer** in NYC (4%)

– Healthcare sector **benefits** from its appeal for **patients from outside NYC** (US & international)

Fragmented Provider Landscape

– **Private hospitals** make up **80%+ of NYC's hospital** market share with top 5 providers serving 50%+ of the market – **fragmented landscape** despite consolidation efforts

– **NYC has largest public hospital system in US (HHC)** which has undergone several **efficiency** and **effectiveness initiatives** while addressing persistent financial challenges

Healthcare Innovation Cluster

– NYC benefits from its **unique ecosystem** encompassing renowned academic institutions, doctors and proximity to Pharmaceuticals sector cluster in NJ

– Building a **life sciences innovation cluster** has been a **strategic priority** for NYC through policy support, e.g. Life Science R&D Tax Credit Program

– **VC investment** into growing Health startup ecosystem is growing at **12% CAGR**[1] ($2.6B in 2019)

1) 2007 to 2019 period
Sources: NYU, NY Department of Labor, City of New York, PFNYC, LMIS, NYC Health Business Leaders

NYC's Healthcare system brings a unique mix of strengths and challenges

Strengths

Best-In-Class Assets
Leading research institutions and educational facilities, largest public hospital system in US (HHC)

Diverse Medical Workforce
NYC at the top globally for its medical workforce, e.g. surgeons, nurses, mental health specialists - NY ranks second in US for number of doctors per population

Above Average Capacity
Hospital capacity above US average (2.7 per 1000 people), growth in home care and ambulatory care

Leading Outcomes
Leading in life expectancy overall (2.5 yrs longer than US average), higher than average physical activity

Challenges

Coordination of Care
Despite rapid pace of health system consolidation, no single system controls >17% of capacity

Affordability of Care
Significant uninsured and Medicaid population (6th most expensive state for healthcare)

Access to Care
Shortage of primary care physicians – especially in lower income parts of city (e.g., East NY, Brownsville, Washington Heights)

Outcomes disparity
Significant disparity by race and economic status (e.g., life expectancy difference of 4.5 yrs between high and low poverty areas – correlation with race / ethnicity)

Sources: NIH, NYU, Center for Health Workforce Studies, NY State of Health, NYC Health, Medbelle

COVID-19 has put NYC's healthcare system under significant pressure

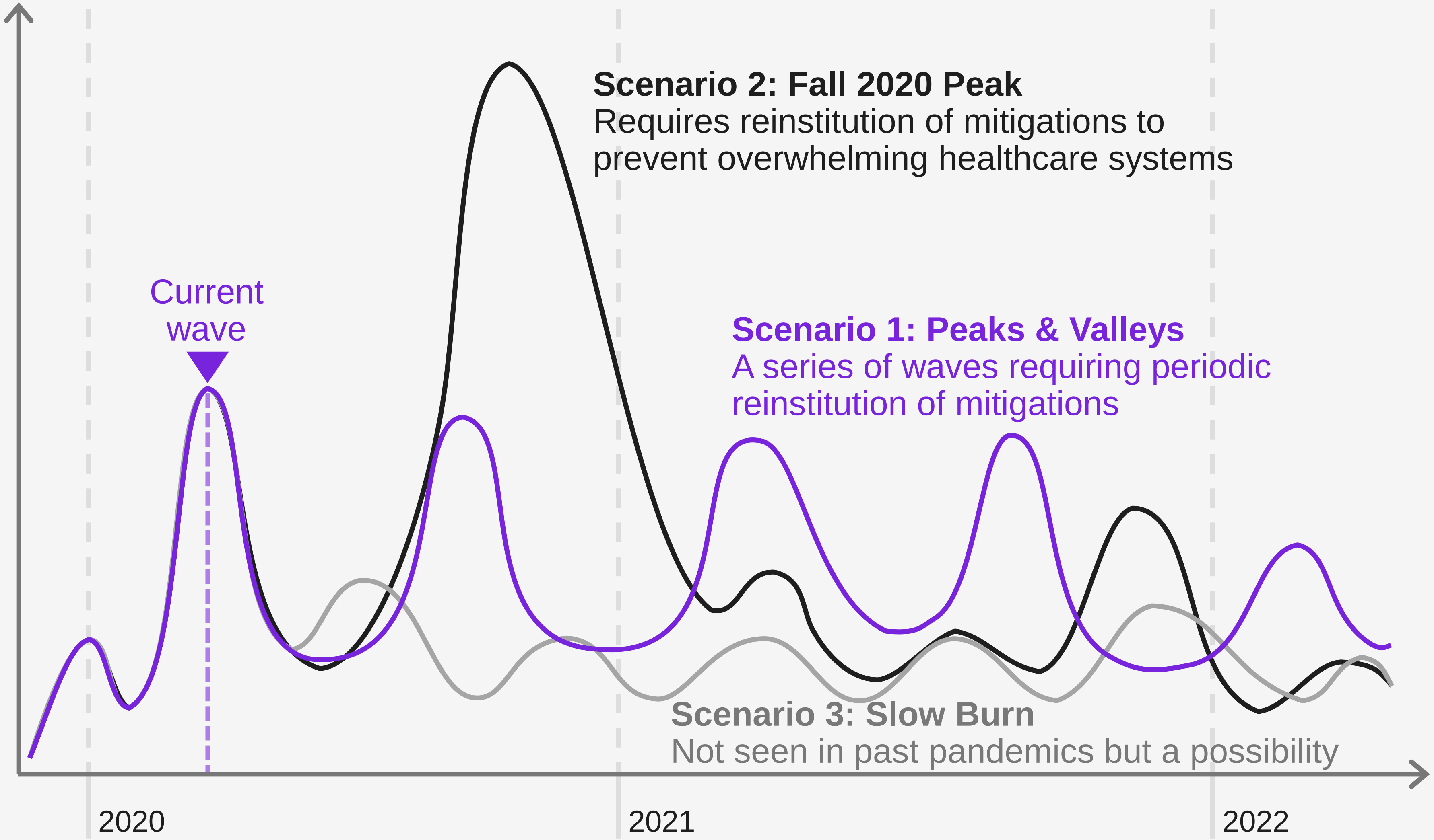
Steep financial losses across hospital systems	NYC's hospital systems each **lose up to $350 – $450MM monthly** due to COVID-19 treatment and deferred / cancelled basic care
Mounting bankruptcy risks for independent / small providers	Unsustainable losses put **independent** and **small providers** at **bankruptcy risk** due to extended closures and delayed procedures.
Capacity shortages for critical supplies and personnel	Large scale **capacity / inventory disruptions** and **lack of visibility**, e.g. ventilators, PPE, hospital beds, personnel
Overburdening of public systems due to increased unemployment	**Peak in unemployment** due to **New York on Pause** has steeply increased influx into public healthcare system, e.g. Medicaid, HHC
Lasting mental health distress of front-line healthcare workers	**20-25%** of **healthcare workers** in **hard-hit areas** expected to **develop disorders**, e.g. anxiety, depression or post-traumatic stress. **6% of physicians** plan to **exit patient care** entirely.
Lack of coordination between providers for patient mgmt., supplies and personnel	**Patient management system** had to be created by NY State to transfer patients between hospitals (2500+ patients daily during peak)

Source: WSJ, New Yok-Presbyterian, NYT, Merritt Hawkins ,Bloomberg, LA Times, NIH, Kearney

Uncertainty around pandemic scenarios leads to questions about the future with – “The New Normal”

NYC must be prepared for another 18 to 24 months of significant COVID-19 activity, with hot spots popping up periodically in diverse geographic areas with uncertainty around which pandemic wave scenario will realize itself

Possible Pandemic Wave Scenarios for COVID-19



Source: Center for Infectious Disease Research and Policy, University of Minnesota, NY Times, Kearney

NYC needs a deliberate strategy to move from survival to optimization in a potentially cyclical COVID-19 environment

Key elements of NYC healthcare strategy to manage three distinct stages of recovery

Phases can be cyclical

Containment / Mitigation

Survive

Manage COVID surge in parallel with only urgent or critical emergent cases; manage all elective and preventive care through telehealth and alternate delivery channels

Key questions

– How to quickly build critical assets and supplies to manage COVID cases while continuing to flatten the curve?
– How to implement risk stratification of non-COVID patients to mitigate risk of deferred care?
– How to use forecasting / analytics for full visibility of leading indicators, e.g. infections monitoring, patient and supply flows / demand management?

Suppression

Resume

Continue to manage COVID base load and hot spots through dedicated capacity while resuming preventive and elective care

Key questions

– How to resume deferred elective and preventive care without triggering COVID outbreaks?
– How to build and manage segmented capacity from a full system perspective for COVID and base patient care?
– How to sustain telehealth supplemented alternate delivery channels (e.g., pharmacy for blood draws)?

Prevention

Optimize

Systematically embed innovations and capabilities catalyzed by the crisis into a post COVID new normal

Key questions

– How to build quality and outcomes data and remote monitoring capabilities into telehealth to achieve and sustain optimal levels?
– How to sustain patient behavior changes driving system-wide value (e.g., mail order Rx)?
– How to implement resiliency where previous short comings, lessons learnt and risk mitigation strategies, e.g. deliberate redundancies, greater integration?

The What: Key elements needed in a NYC build back strategy on healthcare

Innovative Delivery Models

- **Strengthen and scale telehealth** e.g., backed with remote monitoring, quality and outcomes reporting
- **Expand home-care delivery** , e.g. blood work, nursing services, physical therapy, etc.
- **Activate alternate care sites** for diagnostics & screening, e.g. pharmacies, drive-through, mobile vans

Strategic Capacity Management

- **Expansion of hospital capacity** through conversion of space, construction / retro-fitting of additional facilities and temporary / mobile facilities
- **Leverage continuum of care capacity** by shifting activities out, e.g. testing, monitoring
- **Strengthen supplies / assets capacity** with real-time visibility of inventory and shared critical resources, e.g. PPE, ventilators

Smart Labor Management

- **Agile deployment of healthcare talent** to ensure right roles in right place at right time, inclusive of model cross system deployments and movement across the continuum of care
- **Skill set rebalancing** through active management of talent lifecycle from attraction, development and retention to accelerate rebalancing of skill sets needed to support the new normal

Supply Chain Control Tower

- **Buying coalitions** to manage supplier engagement, expand buying power and mitigate risk on critical, scarce supplies and assets (e.g., PPE, ventilators, testing, eventual vaccine)
- **Physical distribution and logistics** of scarce supplies and assets linked to system wide supply and demand planning

Frictionless Financial Flows

- **Infusion of funding** to shore up the system and enable continuity of care
- **Cost optimization** through reduction of in-person / in-hospital services, e.g. telehealth, outside services (home, 3rd party, patient-operated) etc.

Digital Orchestration

- **Analytics enabling capacity management**, e.g. predictive and prescriptive analytics
- **Virtual integration of electronic patient records** to enable full view of patient across systems and continuum of care
- **Public Health apps**, such as contact tracing etc.

The How: Integration, Innovation, Leadership

Virtually Integrated Care Delivery

Virtually integrate delivery across fragmented public / private network of payors / providers

– **Critical resource-sharing** across systems to manage demand peaks
– **Broader acceptance of insurance providers** across systems to expand access
– **Empowered telehealth** to minimize in-person visits and reduce costs in the system
– **Activate alternate settings** that to enable social distancing, e.g. testing, diagnostics & monitoring, back office support
– **Supply Chain Control Tower** to manage critical assets and supplies

Scaling Innovation Broadly

Deliberate strategy to capture and systematize innovation that has been developed during the crisis

– **Surface and deploy out small-scale innovations**, e.g. drive-through blood work / immunization
– **Incentives to sustain and capabilities to scale digital solutions**, e.g. telehealth, virtual patient access etc. to reduce costs and improve patient safety
– **Crowdsourcing** of best-practices, protocols and ways of working across public / private systems through pilot testing, scaling and systematic rollout
– **Dedicated funding pools** for **multi-lateral collaboration** on innovation

Bold, Multi-Level Leadership

Sustainable operating model that institutionalizes public / private coordination of critical services

– **Strong, empowered leadership** to rebuild NYC's healthcare system stronger coming out of the crisis
– **Centralization** of critical capabilities and capacities under single leadership, e.g. agile coalition
– **Incentivize collaboration** between public / private systems
– **Further elevate access and affordability** for **under-insured groups** as a public health priority
– **Remove regulatory barriers** to drive innovation for post-COVID healthcare system

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8C – Ensuring NYC digital access and infrastructure is sufficient post COVID-19

PFNYC Requested inputs:

1. Comparison of the strength of the region's digital resources against peer regions
2. Assessment of digital infrastructure access overlaid with considerations on which gaps in access may drive inequitable outcomes more generally
3. Evaluation of the region's public sector IT systems and infrastructure
4. Cost-benefit analysis of installing a 5G network throughout NY Metro Region
5. Case studies of cities with strong digital infrastructure

©: Challenges further accentuated by COVID-19

Digital Access & Connectivity

Assessment of Digital infrastructure access and implications on equitable outcomes

Strengths

+ Tech training programs have been massively deployed across Manhattan and Brooklyn (800+ sites for adults and K-12 education)
+ Devices have been consciously brought to disadvantaged population as part of multiple programs
+ NYC has released an ambitious Internet Master Plan in June 2020 to address the inequitable internet access across the Metro area
+ NYC has been one of the first global cities to experience 5G deployment

Challenges

– The Digital Divide remains strong in NYC, which is behind peers in broadband and smartphone access

© Divide is accentuated by COVID-19, further limiting access to education, health and economic opportunities

© Public school ICT infrastructure (broadband, devices) remains subpar

© Telecommunications network are saturated in some areas while they are lacking in others

– Massive investments in 5G by private operators is very unlikely to benefit to disadvantaged population

Digital Services, Data & Technology

Assessment of NYC Digital services and underlying data and technology stack

Strengths

+ NYC tops several rankings as world smartest city
+ Wide variety of mobile apps are available for citizen services spanning across health, education, safety…
+ Pilot environment has been launched for exposing public datasets and APIs
+ Infusion of startup talents and regular hosting of hackathons are spurring new ideas
+ Fail-fast philosophy has been adopted, developing 8-week Proof of Concepts to rapidly test new ideas
+ Social media are increasingly used by public officials and teams

Challenges

– NYC has moved from 2nd to 24th in 2019 Global Cities Outlook index, revealing negative trends in livability, FDI, entrepreneurship, private investment and ease of doing business (cf. appendix)

© Citizen services related to health, education, safety, etc. are developed in siloes and are not integrated

– NYC lacks a scalable cloud infrastructure, the current IT stack suffers from high technical debt

© No easy accessibility of Open Data & APIs and deeply rooted legacy ways of working for solution development prevent rapid innovation

© More structured ecosystem partnerships could fuel new investments and funding models

Post COVID-19 NYC must implement the prioritized digital initiatives to accelerate social inclusion and economic recovery

Key Priorities for Digital Access & Infrastructure

Objectives
- S Social Inclusion
- G Growth
- R Resilience

Digital Access & Connectivity

Addressing the Digital Divide to enable equitable access to Health, Education and Economic Opportunities

S G Reduce gaps in access to digital resources
- Provide access to those with the greatest need (e.g. free public WiFi hotspots for online learning in public housing, upgrading public school ICT infrastructure)
- Ensure all digital public services are available and performant on all types of devices (e.g. NYC learning platform)

S G Increase digital literacy
- Equip Community Boards with better tools and train them together with community digital ambassadors to increase community engagement and provide digital resources to the ones in need
- Incentivize tech training and education to cover underserved neighborhoods

S G R Expand communications infrastructure
- Develop open access fiber optic infrastructure working with operators to prioritize neighborhoods having low service level today
- Increase number of mobile sites to densify existing network with 4G and 5G-ready equipment in priority locations (e.g. Underserved Neighborhoods)

S G Develop operators partnership
- Support operators by opening up new public facilities and incentivizing private building owners
- Negotiate counterparts with operators to reduce digital divide, with special plan rates and cheaper reconditioned devices to disadvantaged population

Digital Services, Data & Technology

Enabling Digital uptake in the New Normal, providing relevant systems and tools to derive equitable outcomes

G R Enhance and integrate digital services
- Integrate disparate digital services into one portal
- Enhance health, mobility related services and apps (e.g. telemedicine, job portals, contact tracing)

R Reduce technical debt
- Replace proprietary tech frameworks and languages, upgrade old tech architectures
- Scale digital services by enhancing cloud-based infrastructure and by reducing functional data siloes across departments and agencies

S G Increase usage of open data & APIs
- Stimulate crowdsourcing of applications from the community by sharing of key data sets via portals, apps., accelerating publication of Key APIs
- Increase transparency on public actions, sharing of key data sets, e.g. operational data

G Adopt new ways of working
- Deploy interagency tribes and squads applying key principles of Agile and Design-thinking to deploy solution at scale for citizens and businesses
- Deploy new ways of working within IT organization to become more attractive for tech talents

G R Develop ecosystem partnerships
- Foster partnerships with corporates and startups to unlock investments and diversify funding model
- Align ecosystem on shared visions and objectives for the City, with tangible targets to attain

Improving digital access for NYC population is a key driver of equitable outcomes

	Size		Internet Access				Data access		Device access	
	Population	Area (Sq Km)	Free Public WiFi per Sq. Km	Households with broadband	Avg. fixed broadband speed (Mbps)	Avg. mobile broadband speed (Mbps)	Publicly available data sets	Publicly available APIs	Households with computer access	Smartphone Penetration (of population)
NYC	8.4M	784	1,398	79%	132	42	148	9	88%	80%
SF	0.9M	121	1,477	86%	85	40	438	1	92%	89%
Paris	2.1M	105	3,695	83%	136	43	291	2	79%	83%
Seoul	10.0M	605	945	90%	121	81	520	NA	66%	88%
Dubai	3.3M	4,114	26	85%	101	83	154	12	98%	96%
Singapore	5.9M	725	464	99%	197	54	1811	25	91%	91%

Leading city among selected sample for given metric

PFNYC Requested inputs:

1. Comparison of the strength of the region's digital resources against peer regions
2. Assessment of digital infrastructure access overlaid with considerations on which gaps in access may drive inequitable outcomes more generally

Source: Kearney, NYC Comptroller, AT&T Developer program

Critical gaps to address for NYC

Internet Access

- NYC **lags behind peers in broadband access**: nearly half of the 21% with no broadband access do not have internet access at all
- Lack of broadband access differs widely by **education** (41% of those without high school degree), **socioeconomics** (44% of those below poverty line), etc.

Data Access

- NYC could offer many **more public data sets and APIs**
- This would help individuals, public and private companies to come up with **new applications and services**

Device Access

- NYC **lags in smartphone access**, key drivers being age (more than 1/3 of 45+ do not own a smartphone) and income to a lower extent
- Many **NYC resources** (e.g. learning) are **not optimized for mobile use**

Digital Literacy

- Tech training programs are **unequally distributed across Metro area** (heavily skewed towards Manhattan & Brooklyn)
- Teachings mostly **focus on basic knowledge** but does not equip people to transition to more advanced knowledge (e.g. IT developer as a career)

Implications on equitable outcomes

- Lack of broadband access is more important for disadvantaged populations
- This accentuates the gap in **access to health, education and economic opportunities**

- Inefficiencies are less transparent, hence less solutions are developed to address them
- Easing data access would help ensure **public action adheres to its equity objectives**

- Inequal access to public services as they move online
- Similar to internet access, it accentuates the gap in **access to health, education and economic opportunities**

- A growing number of **economic opportunities** are tied to digital, tech literacy is critical for equitable access to those opportunities

Key to enabling digital access is a strong core citywide network; Countries have taken different paths to achieve it

PFNYC Requested inputs:

5. Case studies of cities – network investment for equitable outcomes

South Korea: Leading the way in 5G

Massive 5G investments early on to bring use cases to life

- Activated first 5G network in April 2019
- Plan to invest **$26 billion to reach 100% 5G coverage** by 2022; $3.4 billion investment planned in H1 2020
- **Penetration of ~10% (50M+ population)** with 100k+ stations deployed as of April 2020
- *New Deal* to boost growth after the coronavirus pandemic massively subsides AI and 5G deployment at scale; 5G technology to **generate $73 billion worth of exports and 600,000 jobs by 2026**

France: Closing the Digital Divide

Adopting gap-funding model before investing massively in 5G

- France was at the bottom of EU rankings for ultra-fast fiber optic broadband coverage (24th/25 in 2017)
- In 2013, France announced a **$24 billion plan to reach 100% coverage in high-speed broadband** service by 2022
- France auctioned **exclusive licenses to roll-out fiber in non-covered territories against tax reductions and open access**
- The Greater Paris area moved from about 50% 30 Mbps coverage in 2013 to 85% by end of 2019
- Fixed broadband is **second most affordable** in EU

Sweden: Internet as a utility

Municipality-deployed networks to make fiber available to all

- Swedish municipalities are **responsible for around 60% of all fiber lines** (~80% national fiber coverage, ~90% in Stockholm metro area)
- They provide **basic infrastructure, operator-neutral networks**, and facilitate a wholesale market on dark fiber, open for interested service providers on equal terms
- Municipal networks are **23% to 38% cheaper** compared to national prices **but profitable**; the average return on investment is around 6-7% (10-11% in Stockholm)

Source: Kearney, Eurostat, OECD

Expanding core network capacity should be the main priority for NYC via a mix of 4G and 5G interventions and development of citywide OFC

PFNYC Requested inputs:

4. Cost-benefit analysis of installing a 5G network throughout NY Metro Region

In the short- to mid-term, only focusing on widely deploying 5G would not be pertinent for NYC from a cost-benefit perspective

~~*Should 5G be deployed throughout the NYC Metro area?*~~

Kearney believes the question NYC needs to address is different

- Current deployment focuses on **enhancing mobile broadband** in **saturated and wealthier areas** are able to afford new hardware (low-end devices will only be available in 3-4 years)
- Current 5G-enabled use cases are of **limited benefits for the society** and only enhance existing applications (3d videos, VR/AR, cloud gaming)
- Deploying **5G throughout NYC Metro area will have an extremely high cost,** requiring high number of small cells interconnected with fiber
- **Densified network is required** for wide deployment of Standalone 5G benefiting the entire population and driving equitable outcomes (10-15 years horizon)

Source: Kearney, Primary and Secondary research

NYC first needs to expand its current network capacity in strategic areas; preparing for wide deployment of 5G in the longer term

How to increase capacity throughout the NYC Metro area?

- Invest in expanding the network in saturated and underserved areas
  - **Develop open access fiber optic infrastructure** working with operators to prioritize neighborhoods having low service level today
  - **Increase number of mobile sites** to densify existing network with 4G and 5G-ready equipment (macro-cells, small cells) in strategic locations
- Establish public-private partnerships with operators to ensure investments benefit to the disadvantaged population
  - **Support operators** by opening up new public facilities and incentivizing private building owners
  - **Negotiate counterparts with operators** to reduce digital divide, with special plan rates and cheaper reconditioned devices to disadvantaged population

NYC Digital applications and technology need to-be upgraded, enabling more equitable outcomes and enhancing the quality of life for its citizens

PFNYC Requested inputs

3. Evaluation of the region's public sector IT systems and infrastructure

Key gaps

Integrated Digital Applications

Fragmented, Siloed Community engagement
- Disparate citizen services across portals
- Insufficient identification of distressed homeless who need shelters
- Minimal apps for elderly (e.g. way finder in subways)

Insufficient Online Education
- Minimal online retraining programs (e.g. Digital Literacy)
- Limited Public Schools ICT
- No e-learning on mobile devices

No Real Time Safety Services
- Minimal surveillance on infectious diseases (e.g. Contact Tracing)
- Few, if any communications of police services
- No early warning apps, (e.g. identify quarantined zones)

Lack of Remote Healthcare
- Minimal dedicated telemedicine channels
- Limited monitoring remote patients
- No one-click access to health call center

Insufficient Tracking of Energy Usage
- Insufficient energy consumption tracking and alerts
- No comprehensive tracking of geo-spatial location / condition of utility infra

Lack of Real-time Transportation Information
- Lack of vehicle flow conscious traffic lights
- No real-time public transport stats (e.g. Occupancy rates in Subway)
- Minimal Personal alert applications (e.g. Parking space)
- Manual Supply and demand planning of public transport

Implications:
- Reduced Jobs: 1-2%
- Increased Disease burden: 5-10%
- 15–30 minutes added to daily commute per person
- Increased Emissions: 10-15%

Data & Technology

Key gaps	Implications
No easy accessibility of Open Data & APIs – Minimal international standards for key data sets, e.g. operational data – Some but experimental sharing of key data sets via portals, apps., APIs – Very few publication of Key APIs (9 APIs)	Reduced crowd sourced innovations (e.g. Private Free Mobile apps.)
Proprietary, Siloed Core IT Architecture – Accumulated technical debt due to proprietary tech frameworks and languages, old tech architectures – for critical systems – Large number of functional data siloes across departments and agencies – Lack of scalable cloud infrastructure to host digital applications	Reduced resilience of critical systems
Selective, Few Sensors & Devices – Insufficient air/water quality sensors, waste receptacle sensors and surveillance cameras to capture data at scale	Inability to capture granular data for decision making

Gover-nance

Key gaps	Implications
Legacy, Bureaucratic Ways of Working – Deeply rooted legacy ways of working for solution development., incl. waterfall, tech-first mindset – Rigid supporting IT processes increasing friction points – Lack of deliberate strategy to leverage partnerships with corporates and startups	Slower time to delivery Lower ability to attract talent

Source: Kearney, Primary and Secondary research

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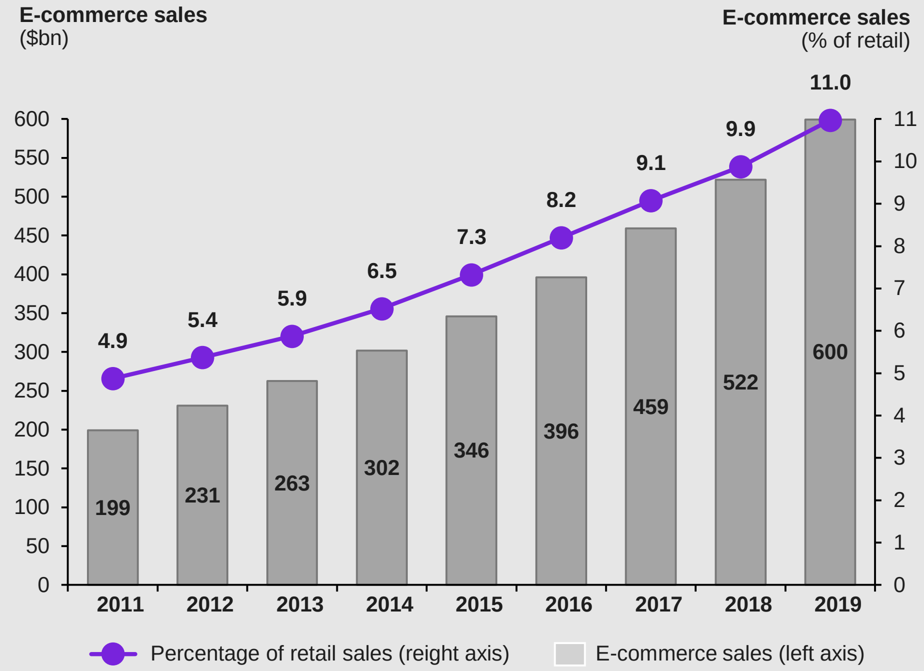
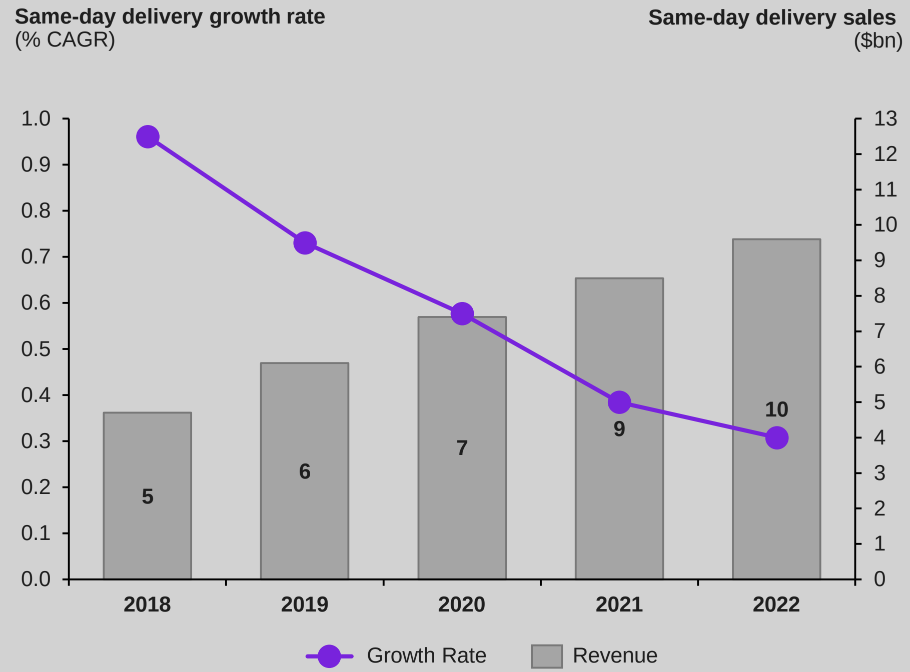
Acceleration of e-commerce and same-day delivery signal the future of the Last Mile

CSCMP State of Logistics Report: annual study which provides an overview of industry trends, macroeconomic factors affecting logistics costs, analysis of each major logistics sector, and insights from industry leaders

U.S. E-commerce Sales Growth



U.S. Same-day Delivery Market



Key insights

– **E-commerce adoption is rapidly expanding** with total sales for February 2020 growing to 17% of total US retail spending, which is a 61% YoY increase

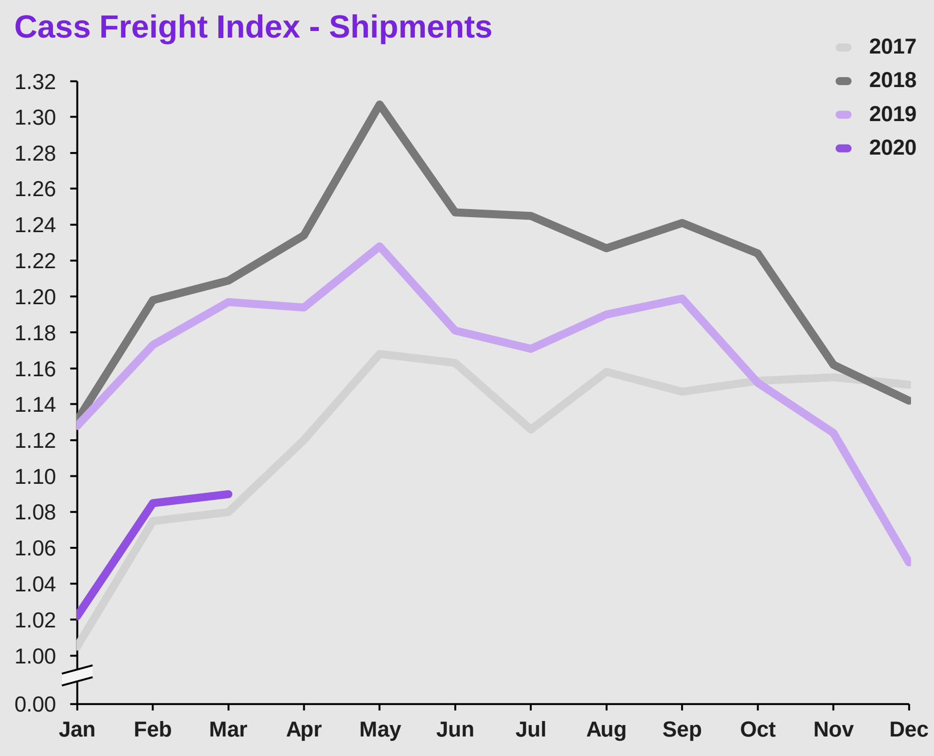
– The **emerging online grocery delivery category**, where 2019 US sales of $32bn increasing 23% YoY, is **moving toward ultra-fast delivery** (defined as less than two hours from click to delivery) as consumers continue to signal that they prefer ultra-fast over in-store shopping or slower deliveries

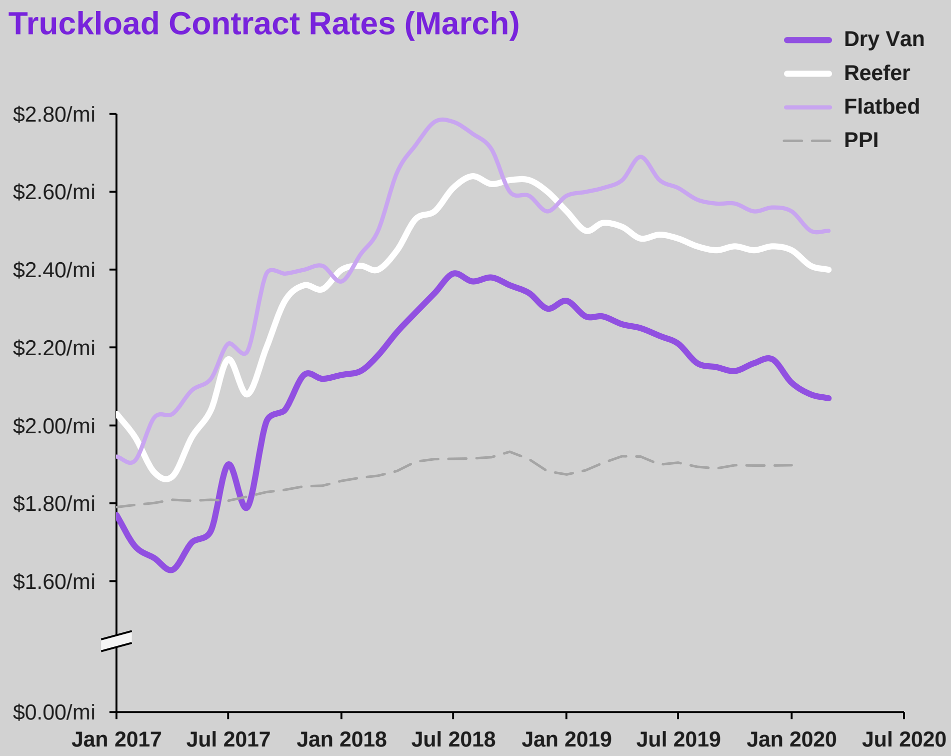
– **Exploding E-commerce and same-day delivery market has grown the U.S. Last Mile sector** 11% in 2019 to $61bn and is expected to reach $107 billion by 2024, a four-year CAGR of 11.7%

– **COVID-19 will have resounding and indefinite effects** as e-commerce and Last Mile delivery have become critical lifelines to securing essential products

Truckload: The COVID Outbreak has tilted rates in favor of shippers; sentiments indicate stabilization but still advantageous for shippers

CSCMP State of Logistics Report: annual study which provides an overview of industry trends, macroeconomic factors affecting logistics costs, analysis of each major logistics sector, and insights from industry leaders





Key insights

- **Truckload volumes are down 9% YoY**, likely driven by decline in "non-essential" activity driven by COVID-19 containment efforts
- The **current US trucking market has moved well past the Covid19 rate spike** and **now heavily favors shippers** as the slowing economy saps demand for capacity. All indicators we track are down
- **Linehaul rates declined 6.6% YoY** in March (the **worst comp reported since June 2009**)
- **Sharp decline in load-to-truck ratios** as shippers have reduced activity amid COVID-19 impacts
- **April utilization has dropped precipitously** (over 70% decrease from March) as truckload demand abates

Enhancing Sustainability

Levers across both strategic sourcing and process improvement can be applied to minimize carbon emissions

Levers	Approach – Design Solutions
Alternate Equipment Type S – Hybrid vehicles, Electric Trucks, Truck Size optimization for demand	– **Collaborative Optimization** based **parametric bidding** to capture $/mile rate information for different equipment type, fuel type and mode for same lane – **alternate bid** – **Optimization scenarios** to calculate the cost of switching to environmental friendly solution – Assign **weightage** to different business constraints from both savings and environment impact – Gather carrier's CSR KPIs via RFI and incorporate in **carrier score card** – Develop scenario recommendations in alignment with companies **CSR goals**
Green Fuel S – Alternate fuel options like bio fuel, electricity, low carbon emission fuels	
Mode Conversion S P – Inter-modal fleet for lanes with less strict transit time requirements	
Asset Utilization P – Improved utilization of assets to reduce number of trucks per mileage	– **Optimize order built up** with right ratio of products that weight out to cube out – **Load consolidation** to optimize number of deliveries, specifically for internal shipments
Network & Route Optimization P – Redesign of distribution and logistics network to reduce total miles – Round trip loop formation to reduce empty miles	– Network footprint optimization to **reduce total distance travelled by SKU** – 3 point, 4 point **loop formation** combining inbound and outbound shipments

S – Strategic Sourcing

P – Process Improvement

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Mapping of NAICS codes to Media and Entertainment sub-industries

NAICS Code	Media subcategory
NAICS 511140 Directory and mailing list publishers	Advertising / PR
NAICS 541613 Marketing consulting services	Advertising / PR
NAICS 541810 Advertising agencies	Advertising / PR
NAICS 541820 Public relations agencies	Advertising / PR
NAICS 541830 Media buying agencies	Advertising / PR
NAICS 541840 Media representatives	Advertising / PR
NAICS 541850 Outdoor advertising	Advertising / PR
NAICS 541860 Direct mail advertising	Advertising / PR
NAICS 541870 Advertising material distribution services	Advertising / PR
NAICS 541890 Other services related to advertising	Advertising / PR
NAICS 541910 Marketing research and public opinion polling	Advertising / PR
NAICS 512230 Music publishers	Music
NAICS 512240 Sound recording studios	Music
NAICS 512250 Record production and distribution	Music
NAICS 512290 Other sound recording industries	Music
NAICS 515111 Radio networks	Music
NAICS 515112 Radio stations	Music
NAICS 711130 Musical groups and artists	Music
NAICS 711211 Sports teams and clubs	Sports
NAICS 711212 Racetracks	Sports
NAICS 711219 Other spectator sports	Sports
NAICS 519130 Internet publishing and web search portals	Digital Publishing
NAICS 519110 News syndicates	News

NAICS Code	Media subcategory
NAICS 323111 Commercial printing, except screen and books	Print Media
NAICS 323113 Commercial screen printing	Print Media
NAICS 323117 Books printing	Print Media
NAICS 323120 Support activities for printing	Print Media
NAICS 451212 News dealers and newsstands	Print Media
NAICS 511110 Newspaper publishers	Print Media
NAICS 511120 Periodical publishers	Print Media
NAICS 511130 Book publishers	Print Media
NAICS 511199 All other publishers	Print Media
NAICS 711110 Theater companies and dinner theaters	Theater
NAICS 711120 Dance companies	Theater
NAICS 711190 Other performing arts companies	Theater
NAICS 512110 Motion picture and video production	TV / Film
NAICS 512120 Motion picture and video distribution	TV / Film
NAICS 512131 Motion picture theaters, except drive-ins	TV / Film
NAICS 512191 Teleproduction and postproduction services	TV / Film
NAICS 512199 Other motion picture and video industries	TV / Film
NAICS 515120 Television broadcasting	TV / Film
NAICS 515210 Cable and other subscription programming	TV / Film
NAICS 532282 Video tape and disc rental	TV / Film
NAICS 541922 Commercial photography	Other
NAICS 711410 Agents and managers for public figures	Other
NAICS 711510 Independent artists, writers, and performers	Other

For this assessment, we interviewed 40+ stakeholders

Representative interviewees

- TV / Film executives
- Broadcast executives and talent
- Network affiliates
- Feature film talent, directors and producers
- Content pre-production (e.g., writers) and post-production (e.g., marketing, P&A) contributors
- Past-Broadway and -theater participants
- Music producers
- National and global (e.g.,. Olympics) sports representatives
- Advertising agencies
- Media data science leaders (tubular and others)
- Major telco board members and executives
- Multiple executives at FAANG companies
- Local and national news organizations
- Gaming executives and experience leads
- New-age digital technology providers (e.g., VR/AR, AI)

NYC's government has a number of programs in place focused on maintaining the city's status as a global media capital

Non-Exhaustive

NYC Media Support Programs

NYC Govt. Media Industry Support Initiatives

NYC Media Lab
Partners companies advancing new media tech. with academic institutions conducting research in the area

NYC Venture Connect
Website serving as a central information portal for entrepreneurs, managed in partnership with Columbia University

JumpStart New Media
Training program to assist displaced or entrepreneurial junior/ mid-level employees exploring opportunities in new and digital media

NYC Entrepreneurial Fund
$22M fund targeting early stage NYC-based technology startups

Hive at 55
Launched a center to house media freelancers on a short-term basis and provide access to resources

Incubators
Partnering with academic institutions and commercial landlords to develop ready-to-use high-quality office space for startups to sublease

NYC Venture Fellows
Provides select entrepreneurs from various industries with resources to build scalable NYC-based businesses

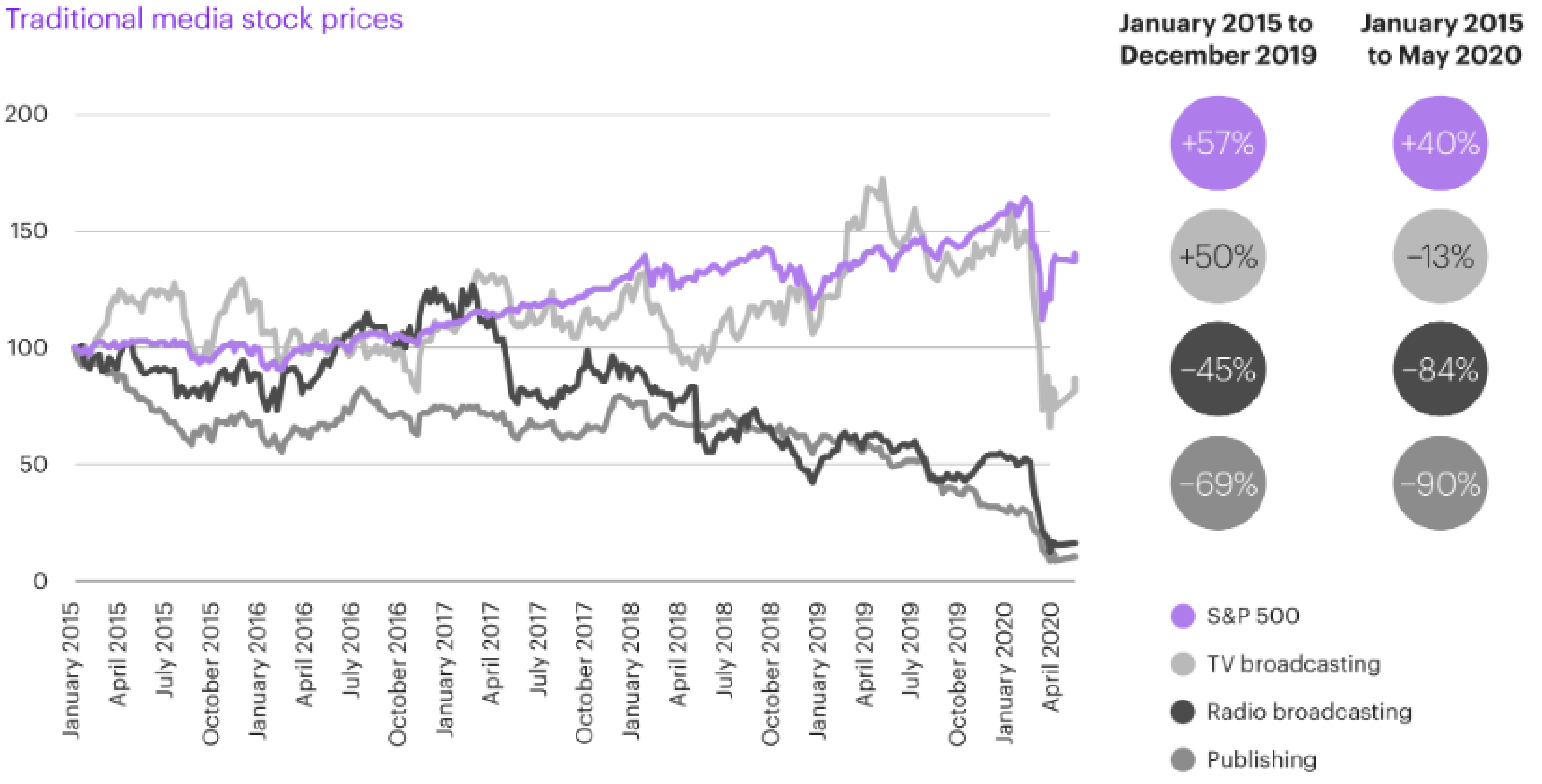
International and Domestic Recruitment
Recruitment campaign to encourage multinational media companies to open offices in NYC

Source: NYCEDC

Traditional media stock prices

Figure 1

Media companies' stock prices have plummeted in the wake of the COVID-19 outbreak



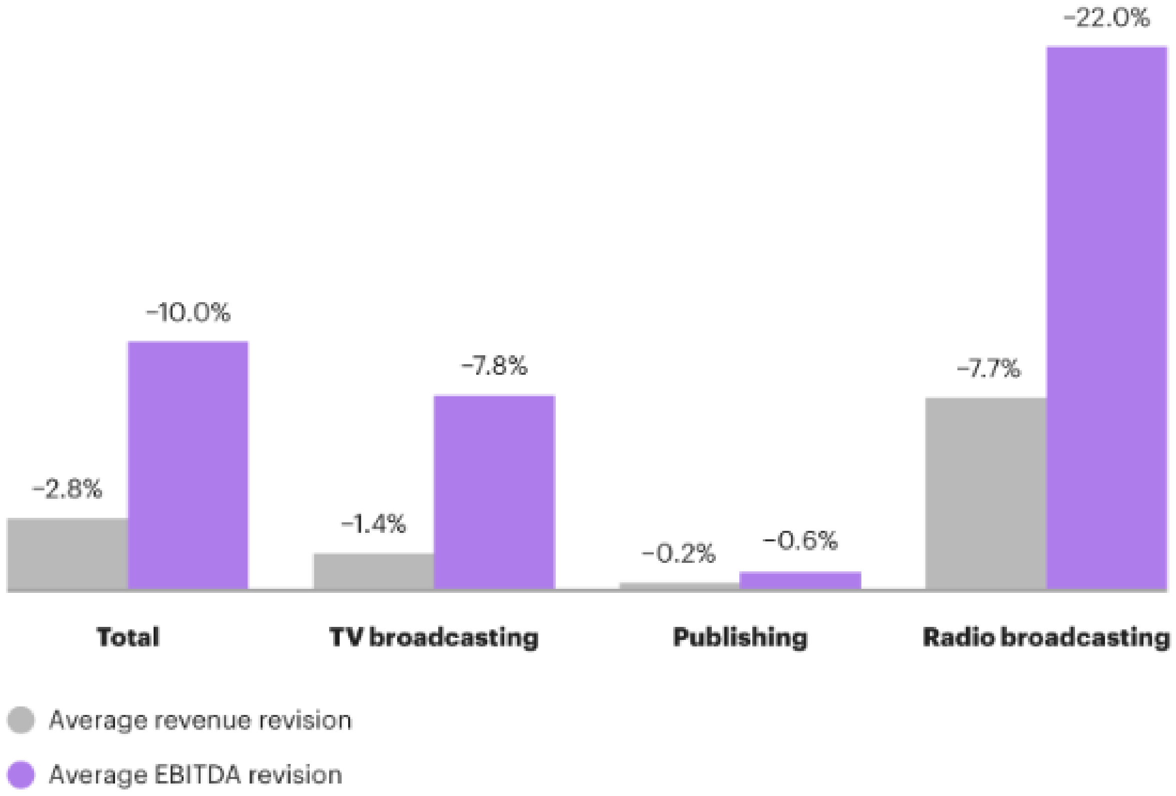
Sources: Thomson Reuters Eikon; Kearney analysis

US media sector analyst revisions

Figure 2

The global pandemic is chipping away at media outlets' revenue and profits

US media sector analyst revisions



Average change between January 1 and April 10, 2020

	Revenue	EBITDA
Total	-2.8%	-10%
Broadcast	-1.4%	-7.8%
Publishing	-0.2%	-0.6%
Radio	-7.7%	-22.0%

Sources: Capital IQ; Kearney analysis

Everything we thought would happen over the next 15 years in media, might just happen over the next 15 months

Acceleration of media trends

Value Chain Element	Assets	Overall Dynamic Post-COVID
Content Origination	**New Production** *(Studios)*	Still lifeblood but will have new DNA
	Content - Catalogue & Licensed *(esp. Movies / Series / Kids / Sports)*	Resurgent value in a streaming world
Aggregation/ Distribution (Broadcast)	**Live** *(Premium Sports & News)*	Alive but big shift
	Scheduled *(Premium e.g. HBO, Showtime & Non-premium e.g. TCM, The CW)*	Eroding pillars
Aggregation/ Distribution (Services & Platforms)	**IP streaming services** *(e.g. Netflix, Amazon, Hulu)*	Fast-becoming the default for consumers
	Bundling platforms *(Cable TV, SatelliteTV)*	Traditional distribution, but bundling alive
Other	**IP Monetization** *(Gaming, Parks, Merchandising)*	Gaming up, Others neutral
	Advertising	Key competitive tech lever

Legend

- Positive
- Moderately Positive
- Neutral
- Moderately Negative
- Negative

As NYC thinks about how to support the media industry, each element of the value chain will be impacted across several key dimensions: New Content, Usage Habits & Tech Implications, Market Power & Regulatory Shifts, Nationalist/Populist Psyche

Source: Kearney

Select quotes from discussions with industry players

- “Netflix/Amazon have figured out when content can afford perfection and when good enough will yield the same eyeballs” –Hollywood Producer
- “Disney will stay to the masses & families, Netflix has the ability to push niche content, and Amazon will expand services to enrich the platform experience, HBO Max needs to carve out a unique positioning to take share” – SVOD Exec
- “Content creators will need advertising, don’t give up on AVOD; younger generations are receptive to focused personal ads as they grew with social media” – Top Broadcaster
- “There is so much opportunity in post production, streamlining from content to consumer would save time and lots of money” – Hollywood Agency
- “Users don’t just want an SVOD or an AVOD, they want an experience something they can interact and engage with” – AVOD Product Team
- “Creative production was critical in the drafts, some groups can execute analytics and less technical functions from home” – National Sports League Strategy
- “Sports will become personalized to viewer desires, the distributor that partners with leagues and OEMs to enable the best tech will monetize their rights the fastest” – Affiliate Network Director
- “ One thing we have learned is that consumers want more than to see something new they want experience something with their friends and family to build an experiential memory” – Telco
- “Someone in news will figure out that consumers want to hear the facts and talk about opinions, we have to let them talk” – Local and National News Lead
- “We embraced users using each other’s logins, growth is about winning mind share” – SVOD Exec

Source: Kearney

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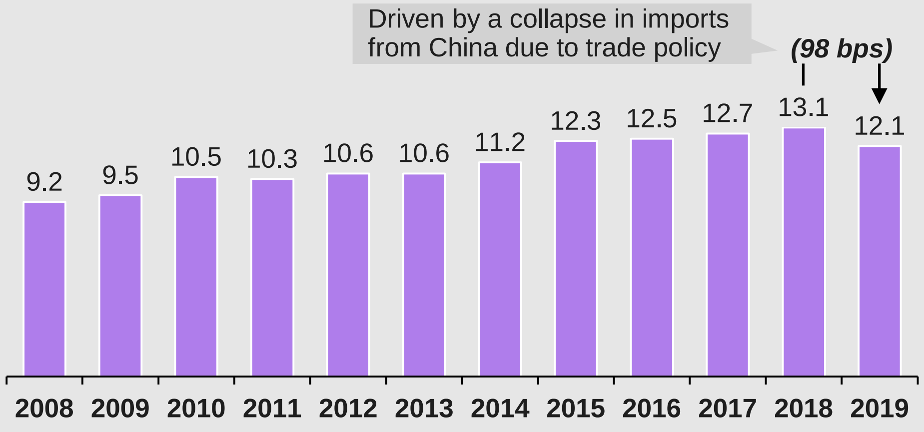
Trade war spurs sharp reversal in 2019 Reshoring Index, foreshadowing COVID-19 test of supply chain resilience

Kearney Reshoring Index: annual study that compares US manufacturing gross output to import data from 14 Asian low-cost countries (LCCs)

U.S. Manufacturing Import Ratio (MIR)

(%, 2013 – 2019)

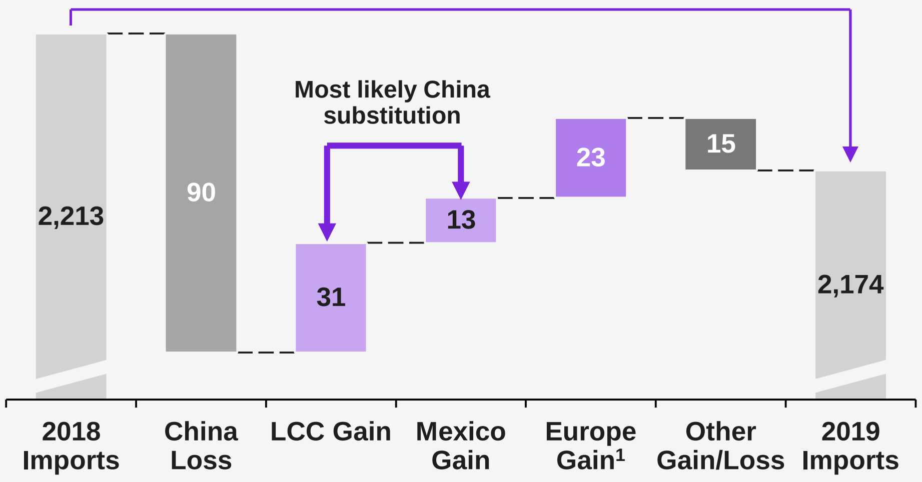


Import Countries

- China
- Taiwan
- Malaysia
- India
- Vietnam
- Thailand
- Indonesia
- Singapore
- Philippines
- Bangladesh
- Pakistan
- Hong Kong
- Sri Lanka
- Cambodia

U.S. Manufacturing Import Mix Change

(Real $billion, 2018 – 2019)



- **While manufacturing imports to the US from China have declined, those from other Asian LCCs and Mexico have grown**

Key insights

- **In 2019, imports from the 14 Asian trading partners we studied sharply declined, particularly from China**, while US domestic manufacturing was virtually unchanged from 2018.
- **As a result, the seventh annual US Reshoring Index was by far the highest yet recorded**, dramatically reversing a five-year trend. The ongoing US–China trade war was clearly the driving force in this abrupt shift.
- **Intriguingly, manufactured imports from Vietnam and Mexico both increased**, evidence that US companies were starting to adapt their sourcing strategies even before the COVID-19 onslaught.
- **2020 dawned with a disruption of a new order of magnitude—COVID-19.** We anticipate the harsh lessons of this crisis will compel companies to go much further in rethinking their sourcing strategies—indeed, their entire supply chains.

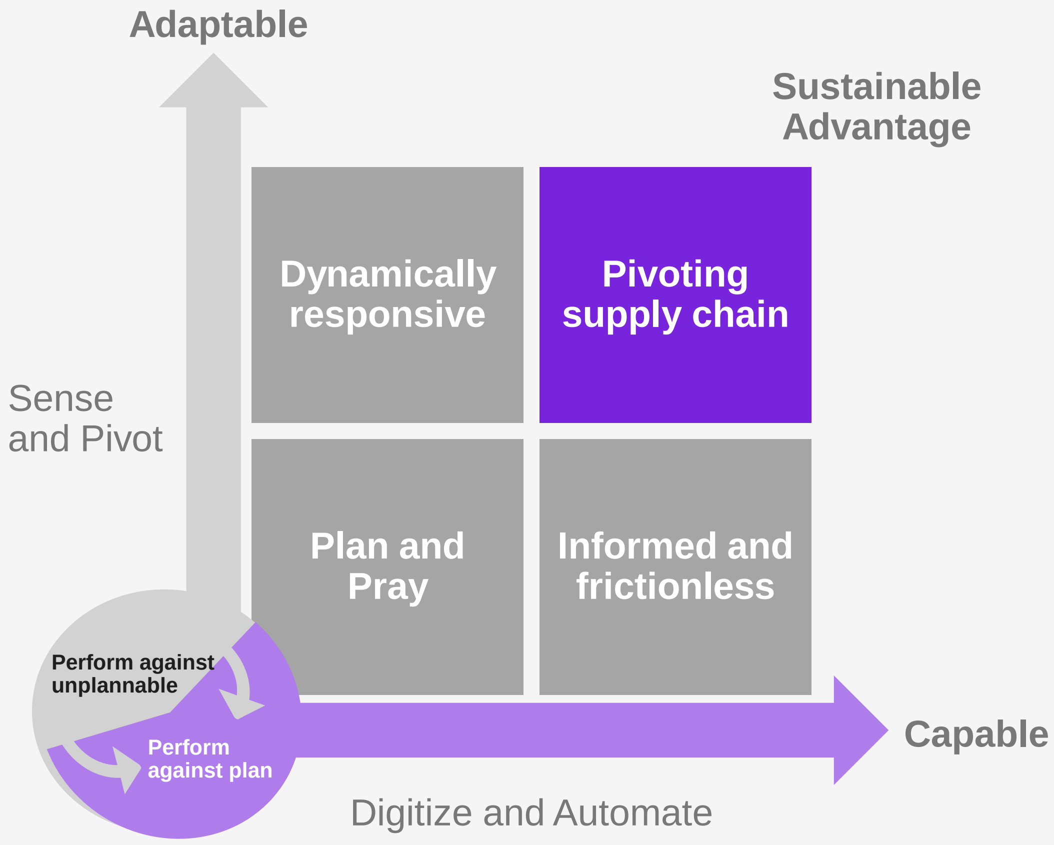
1. Most likely due to increase in demand for European-specific imports (e.g. Luxury cars)
MIR = Total Manufactured Goods Imports as % of Domestic Manufacturing Gross Output
Source: United States International Trade Commission; United States Department of Commerce Bureau of Economic Analysis

Kearney XX/ID

Even today's most sophisticated supply chains still try to predict what will happen, then optimize performance against plan. The problem is, the world is not predictable. You need a supply chain that pivots.

Kearney Supply Chain Resiliency Framework

Supply Chain Resiliency – Sense and Pivot



Supply chains are under tremendous pressure due to:

- Soaring customer expectations
- Expanding product portfolios
- Channel proliferation
- New competitors
- Technological upheaval

Digitization is fundamental…

- Leading companies are already digitizing and automating supply chains to perform more reliably and efficiently

However, with only digitization, supply chains will:

- Still lack the flexibility to adapt in real time to unprecedented demands and unplanned situations
- Routinely fall short of expectations

Supply chains must continually *sense and pivot* in response to changing conditions:

- Sustained competitive advantage can only be achieved by making supply chains highly attuned and adaptable to changing demands and conditions, as well as technologically competitive in terms of speed, efficiency, and reliability

The COVID-19 pandemic is proving an urgent threat but will transform the consumer & retail landscape permanently

Kearney Consumer Research

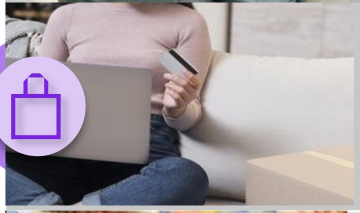
What qualities have been the most important to you in shopping for products before and after the pandemic?

	Pre-Pandemic		Post-Pandemic		
Quality	% in the Top 3	Rank (out of 9)	% in the Top 3	Rank (out of 9)	Δ% in the Top 3
Availability	37%	4	73%	1	37%
Price	78%	1	65%	2	(13%)
Quality	70%	2	42%	3	(28%)
Convenience (e.g. closest store)	36%	5	41%	4	6%
Safety in retail experience (trusted stores, delivery or curbside process)	8%	8	36%	5	28%
Trusted Brands	43%	3	24%	6	(19%)
Customer Service	18%	6	10%	7	(9%)
Environmentally friendly or sustainable	9%	7	7%	8	(2%)
Other	1%	9	2%	9	1%

Key insights

Brands who were crisis leaders will have lasting trust with consumers

- **Trust will be a top factor** for consumer choice
- Consumers will be drawn to brands that put **consumers and employees <u>needs</u> first and take a stand**
- In addition to authenticity, consumers will seek brands that display **real expertise, 'no-frills', unprejudiced patriotism and social care**



The rise in digital engagement and eCommerce will remain

- **Customer engagement** and communication will be **digital first**
- **eCommerce** will rise from **20% to 40%,** driven by shift of commodities/grocery
- **Delivery and quick pick-up solutions** will be table stakes
- Retailers and brands will be offer **one-stop shops** for products / services, **20% of physical stores will shut down**

Serving value-consumers will be new battleground

- Consumer values will have shifted to **focus on the 'essential'**
- Retailers and brands **targeting value consumers** effectively will continue to **strengthen**
- Retailers and brands will refocus offerings to **essential, trend categories** and eliminate "fads", and will further push **private label** offerings

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Healthcare Innovation: Supplementary Materials

Three reports have been included under separate cover for additional detail healthcare innovation:

1. When the dust has settled: healthcare after COVID-19
2. Life science supply chains: how COVID-19 will change them forever
3. How to rebound stronger from COVID-19: building resilience in manufacturing and supply

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Kearney 2019 Global Cities Index – NYC Summary

Source: Kearney 2019 Global Cities Index

New York city has a consolidated position and excels in a mix of factors such as **business activity (established global firms, job growth, and private investment), human capital (educational institutions, educated workforce), and access to information and access to information and technology**, consequently NYC will continue to be a global leader.

However, **New York City may struggle to sustain its position as a center of start-up activity, innovation and technology companies**. The Global Cities Outlook, an indicator that measures the future potential, reveals a negative trend of FDI, entrepreneurship, and private investments.

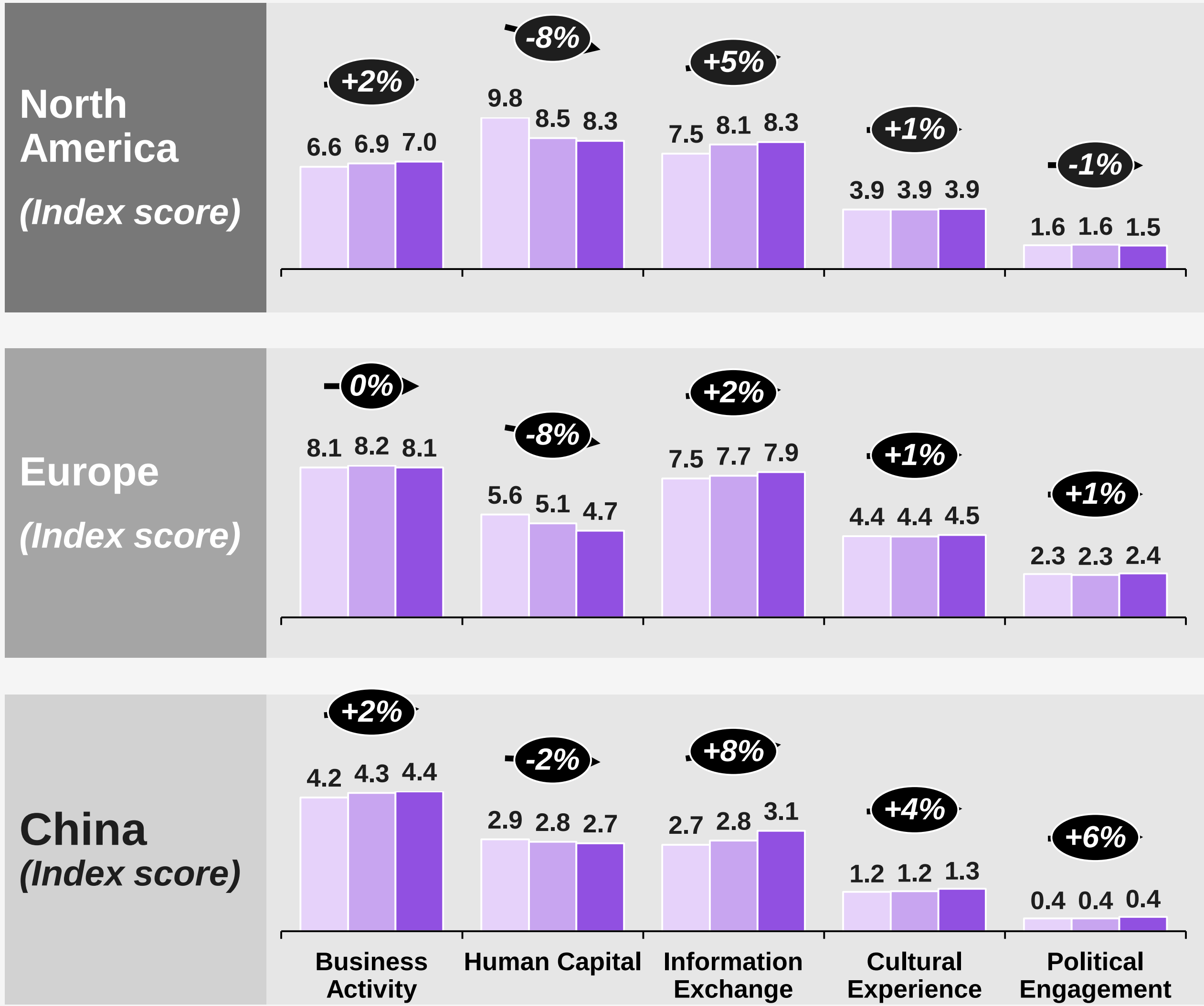
Established global cities, like New York, **may face significant competition from emerging urban hubs**. This year's study signals that some cities are arising as the challengers and they are outpacing the already established American urban hubs, such as San Francisco, New York, and Chicago.

In general, **U.S. cities aren't improving at the same pace as those in other regions**. Therefore encouraging the development of human capital and the right economic and political environment are areas that U.S. cities should consider—especially if they want to attract corporations and secure investment from foreign investors.

The ability to attract and retain Human Capital is essential for all regions, while Information Exchange and Business Activity are driving growth

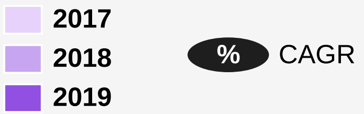
Index Regional Performance

Source: Kearney 2019 Global Cities Index



Insights

- Business Activity experienced growth in North America and China, while in Europe remains flat due to the uncertainty
- Human capital scores declined, driven by the fact that emerging cities still struggle to keep pace with metric leaders
- Information Exchange is gaining ground and is the growth engine in the Index across regions

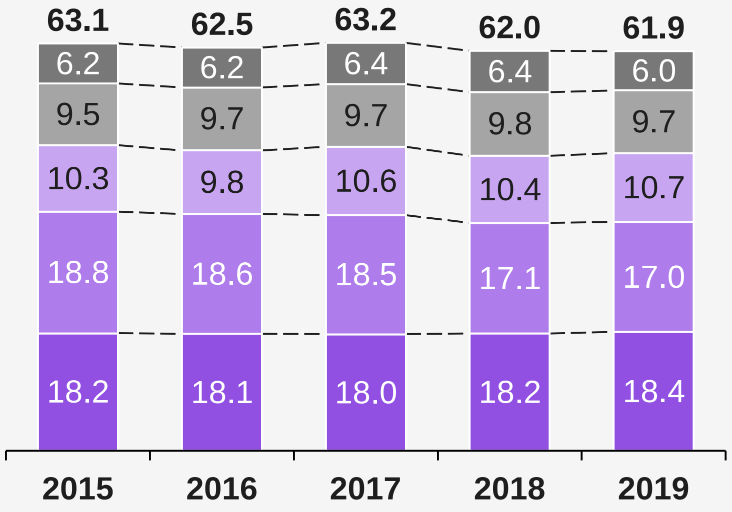


New York continues with strong momentum in Business Activity, while also leading the global scores in Human Capital

Index Performance – New York

Source: Kearney 2019 Global Cities Index

Score Trend



Index position by dimension

	2015	2016	2017	2018	2019
PE	3rd	3rd	2nd	2nd	3rd
CE	2nd	2nd	2nd	3rd	3rd
IE	2nd	7th	2nd	4th	3rd
HC	1st	1st	2nd	1st	1st
BA	1st	1st	1st	1st	1st

Insights

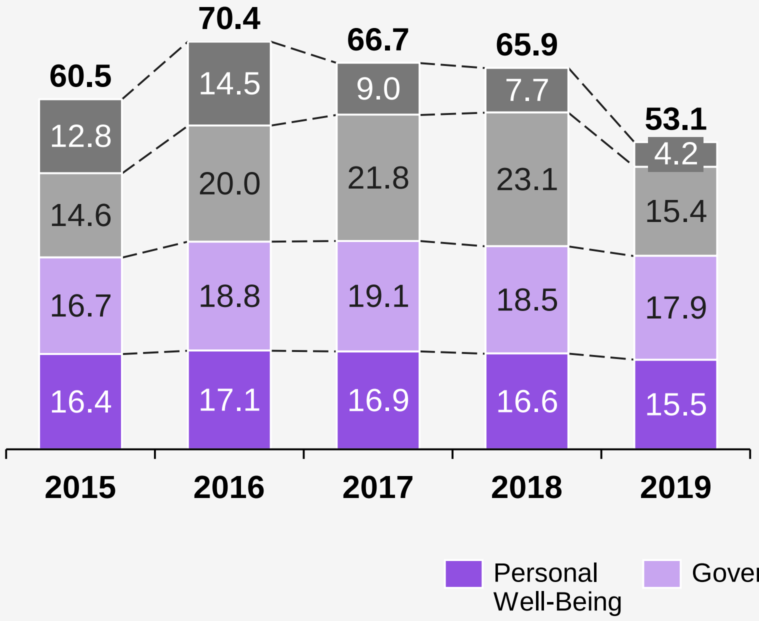
- New York received its highest score in Information Exchange due to more media access and new news agencies bureaus
- Promoting political and civic participation via Think Thanks and International organizations can improve its performance in Political Engagement

New York has lost ground in every dimension leaving the top 10, while other emerging hubs are outpacing the big apple

New York in the Outlook

Source: Kearney 2019 Global Cities Index

Performance



Outlook position by dimension

	2015	2016	2017	2018	2019
Inn	3rd	3rd	4th	5th	**15th**
Eco	11th	2nd	1st	1st	**7th**
Gov	17th	14th	13th	15th	**23rd**
PWB	51st	43rd	46th	45th	**55th**

Insights

– Outlook results reveal a negative trend in FDI, entrepreneurship, and private investment, and a general decline in the ease of doing business.

– Emerging cities are outpacing New York in PWB, Economics, and Innovation drove by drops in stability and security environment, infrastructure trend, and patents per capita

New York is not keeping the pace in PWB, negative trend in FDI inflows drives the drop in Economics, Innovation and Transparency are also experiencing downward trends

New York – Outlook performance by metric (1/2)
Comparison 2018-2019

Source: Kearney 2019 Global Cities Index

	Overall			PWB			Economics			Innovation			Governance		
	2018	2019	19 - 18	2018	2019	19 - 18	2018	2019	19 - 18	2018	2019	19 - 18	2018	2019	19 - 18
Rank	2	24	-22	45	55	-10	1	7	-6	5	15	-10	15	23	-8
Score	65.88	53.05	-12.83	16.56	15.49	-1.06	23.09	15.38	-7.71	7.71	4.25	-3.46	18.52	17.93	-0.59

Stability and Security				
Raw Data	FC Data	Score	Rank 19	Δ
0%	-13%	-28%	109	-25

- Maintained the level of stability and security
- NY is experienced a negative trend relative to previous performance and other cities are increasing faster

Healthcare Evolution				
Raw Data	FC Data	Score	Rank 19	Δ
0%	-1%	0%	25	-5

- Maintained the quality of healthcare
- Decrease in rank due to other cities improving at a faster rate

Gini Index				
Raw Data	FC Data	Score	Rank 19	Δ
0%	1%	0%	108	4

- Maintained the level of Gini
- Improved in rank due to other cities experienced a negative trend in terms of reducing inequality

FDI Inflow				
Raw Data	FC Data	Score	Rank 19	Δ
-30%	-77%	-86%	26	-25

- FDI decrease 30% vs 2017
- The data reveals a negative trend relative to its previous performance

Infrastructure Trend				
Raw Data	FC Data	Score	Rank 19	Δ
0%	-13%	-14%	41	-25

- Infrastructure investments are dropping relative to the performance in 2013, other cities are outpacing New York

GDP per Capita				
Raw Data	FC Data	Score	Rank 19	Δ
1%	-1%	8%	3	2

- Maintained the level of GDP per capita
- New York is performing is closing the gap with the leader and performing better than other cities

Patents per 100 pop.				
Raw Data	Forecast	Score	Rank 19	Δ
1%	5%	-7%	39	-

- The leader is increasing at a faster pace than the flat trend of New York, maintained the 39th position

Private Investments				
Raw Data	Forecast	Score	Rank 19	Δ
-11%	-39%	-63%	11	-8

- NYC decreases in private investment and it is experiencing a negative trend relative to its previous performance
- The leader and other cities are outpacing New York

Entrepreneurship				
Raw Data	Forecast	Score	Rank 19	Δ
0%	0%	-18%	17	-5

- Maintained the number of incubators in the city
- New York's score decrease because is not keeping the pace with the leader and other cities

Quality of Bureaucracy				
Raw Data	Forecast	Score	Rank 19	Δ
0%	0%	0%	14	-2

- Maintained the quality of bureaucracy and the relative position to the leader, decrease in rank due to other cities outpacing NYC

Ease of Doing Business				
Raw Data	Forecast	Score	Rank 19	Δ
0%	1%	3%	69	-28

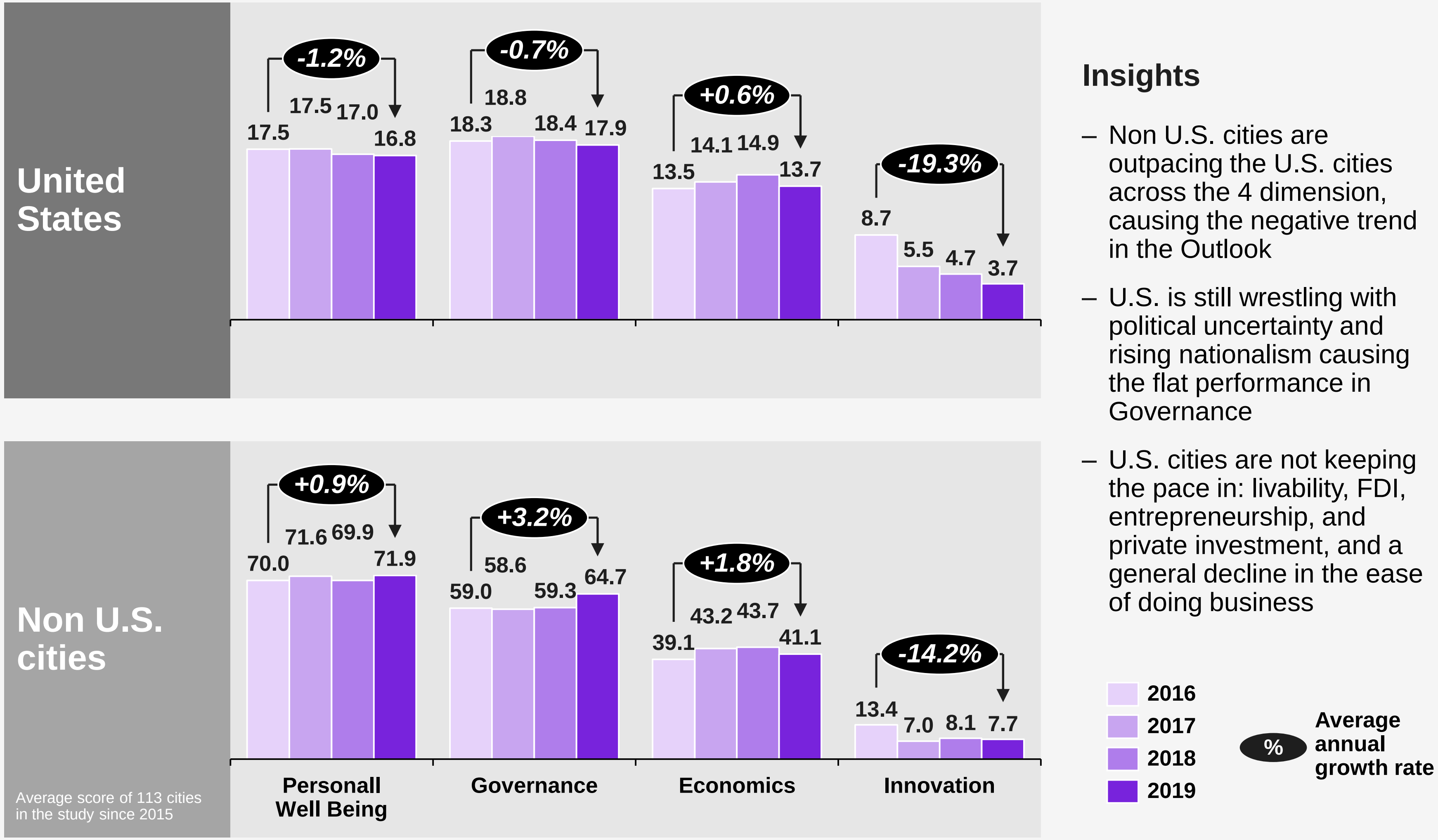
- Maintained the ease of doing business
- Other cities experienced a positive growth trend, outpacing New York in ease of doing business

Transparency				
Raw Data	Forecast	Score	Rank 19	Δ
-5%	-13%	-11%	22	-12

- New York experienced a negative trend in transparency
- Additionally, transparency is dropping more relative to its performance in previous years

United States results show a negative trend due to U.S. cities aren’t improving at the same pace as those in other regions

United States Outlook trends – Average Score



Source: Kearney 2019 Global Cities Index

Insights

- Non U.S. cities are outpacing the U.S. cities across the 4 dimension, causing the negative trend in the Outlook
- U.S. is still wrestling with political uncertainty and rising nationalism causing the flat performance in Governance
- U.S. cities are not keeping the pace in: livability, FDI, entrepreneurship, and private investment, and a general decline in the ease of doing business

Thank you

For questions or comments on this material, please contact:

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