COVID-19 is, first and foremost, a global humanitarian challenge. Thousands of health professionals are heroically battling the virus, putting their own lives at risk. Governments and industry are working together to understand and address the challenge, support victims and their families and communities, and search for treatments and a vaccine.

Companies around the world need to act promptly. This document is meant to help senior leaders understand the COVID-19 situation and how it may unfold, and take steps to protect their employees, customers, supply chains and financial results.
Executive summary

The situation now

COVID-19 has seen a consistent case decline in countries that had experienced rapid case growth early (esp. China, South Korea)

However, cases outside of Asia are growing dramatically, driven primarily by complexes in Europe and the Middle East. The United States, while it has confirmed only a limited number of new cases, appears to be set for a large increase in cases once testing kits become widely available.

Possible future scenarios

Delayed Recovery: The virus continues to spread across the Middle East, Europe and US until mid Q2, when virus seasonality combined with a stronger public health response drives case load reduction.

Prolonged Contraction: The virus spreads globally without a seasonal decline, creating a demand shock that lasts until Q2 2021. Health systems are overwhelmed in many countries, especially the poorest, with large-scale human and economic impact.

Actions for companies to consider

A central, cross-functional Nerve Center can coordinate efforts to:

- Protect employees and give them a strong sense of shared purpose
- Stress-test financials
- Stabilize the supply chain
- Engage customers

Sources: World Health Organization Situation Reports, news reports, McKinsey analysis
COVID-19 appears to be more dangerous than the flu

Latest as of March 15, 2020

Features of the disease to date

1.5-2x
Higher reproduction than the flu

Up to 20%
Of cases have a severe/critical form of the disease

~0.9%
Case Fatality Ratio in South Korea after widespread testing. CFR appears higher where cases are missed and is higher when health systems are overwhelmed

Comparison to other diseases

Early identification of the disease, intensification of viral control, and treatment, when available, will reduce reproduction number and case fatality

Comparison to other diseases

1. Evidence on exact numbers are emerging, however expected to decrease as viral containment measures intensify and treatments are developed
2. WHO estimates the global average CFR at 3.4%, dependent on conditions such as patient age, community immunity, and health system capabilities. Latest case fatality ratios were calculated as death/cases
3. In outbreak setting or the introduction of a new disease
4. Case Fatality numbers reflect outbreak settings and factors such as the patient’s age, community immunity and health system capabilities
5. Estimates are very context and time specific, however are provided from prior outbreaks based on academic lit review
6. WHO estimates 15% severe and 5% critical

Sources: World Health Organization, CDC, Nature, The Lancet, PLOS One The Journal of Infectious Diseases, BMC Infectious Diseases, Infectious Disease Modelling, news reports

Reproduction number (average number of people infected by each infected person in outbreak setting)

Case Fatality (proportion of deaths among confirmed cases)

Low (<2%)  Medium (2-15%)  High (>15%)

Low (2-4)  Medium (2-4)  High (>4)

Zika (C)  SARS-CoV (F)  Measles3 (H)

Chickenpox (D)  Polio3 (G)  Smallpox (K)

Influenza H1N1 2009 (A)  Influenza H2N2 1957 (B)  Influenza 1918 (E)

Ebola (West Africa 2014) (I)  SARS-CoV (F)  MERS-CoV (J)

COVID-19 (red)
The global spread is accelerating with more reports of local transmission

Latest as of March 15, 2020

<table>
<thead>
<tr>
<th>Impact to date</th>
<th>&gt;153,000</th>
<th>&gt;5,700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reported confirmed cases</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deaths</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| >140 | >80 | ~40 |
| Countries or territories with reported cases | Countries or territories with evidence of local transmission | Countries or territories with more than 100 reported cases |

| <1% | ~75% | >40 |
| China’s share of new reported cases March 9th-15th | New reported cases on March 9-15th from Europe | New countries with cases March 9th-15th |

1. Previously counted only countries; now aligned with new WHO reports; excluding cruise ship;
2. Previously noted as community transmission in McKinsey documents; now aligned with WHO definition

Sources: World Health Organization, CDC, news reports
The virus is located in 5 major “transmission complexes”

A complex is an area with confirmed local transmission, and more than 100 confirmed cases, where it is difficult to prevent people’s movement.

- **Europe**
  - Total cases: >45,000
  - Total deaths: >1,700

- **China complex**
  - Total cases: >81,000
  - Total deaths: >3,200

- **Middle East**
  - Total cases: >13,900
  - Total deaths: >620

- **America**
  - Total cases: >2,300
  - Total deaths: >40

- **Asia (excl China)**
  - Total cases: >10,100
  - Total deaths: >110

Source: World Health Organization, team analysis

1. WHO data is lagging news reports for the US; In the US, CDC & WHO reports >1,600 cases; NYTimes reports >3,600 cases
2. Includes Western Pacific and South-East Asia WHO regions; excludes China; Note that South Korea incremental cases are declining, however other countries are increasing
3. Eastern-Mediterranean WHO region

Current as of March 16, 2020
### Progression varies widely among countries

<table>
<thead>
<tr>
<th>Country</th>
<th>Status</th>
<th>Recent Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>China</strong></td>
<td>New cases at low levels throughout China</td>
<td>- Strict containment and quarantine</td>
</tr>
<tr>
<td>&gt;81,000</td>
<td>&gt;3,200 Cases</td>
<td>- Significant testing at facilities and in Hubei</td>
</tr>
<tr>
<td>Cases</td>
<td>~4.0% Case Fatality</td>
<td>- Construction of makeshift hospitals to increase capacity</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>South Korea</strong></td>
</tr>
<tr>
<td>&gt;8,100</td>
<td>&gt;70 Cases</td>
<td>- Significant preparedness &amp; rapid regulatory approval process for tests</td>
</tr>
<tr>
<td>Cases</td>
<td>~0.9% Case Fatality</td>
<td>- Rapid roll-out of diagnostics (e.g., diagnostic drive-through)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Hospitalization available for lower-severity cases &amp; significant hospital coordination</td>
</tr>
<tr>
<td><strong>Italy</strong></td>
<td>~3,500 new cases on March 15th – the highest in the world, corresponding to a ~180% increase in the last week¹</td>
<td>- Efforts initially focused on Northern Italy, but efforts now extend to the entire country, including cancellations of larger gatherings</td>
</tr>
<tr>
<td>&gt;21,100</td>
<td>&gt;1,400 Cases</td>
<td>- Healthcare recruiting efforts due to strain</td>
</tr>
<tr>
<td>Cases</td>
<td>~6.8% Case Fatality</td>
<td>- Schools closed nationwide</td>
</tr>
<tr>
<td><strong>US</strong>²</td>
<td>US cases are increasing daily, however official reporting may be lagging¹</td>
<td>- A national emergency was declared on March 13 with Congress aiming to provide testing free of charge</td>
</tr>
<tr>
<td>&gt;1,600</td>
<td>&gt;40 Cases</td>
<td>- &gt;29 states have declared emergency with a range of actions including school closures, bans on large gatherings and large-scale testing plans</td>
</tr>
<tr>
<td>Cases</td>
<td>~2.4% Case Fatality</td>
<td></td>
</tr>
</tbody>
</table>

1. Number of new confirmed cases on March 15th compared to March 8th
2. Case Fatality calculated as (total deaths) / (total cases) – this rate is evolving and dependent upon several factors, including number of suspected cases that are tested
3. WHO data is lagging news reports for the US; in the US, CDC & WHO reports >1,600 cases; NYTimes reports >3,600 cases

Source: WHO situation reports, US CDC, press search

*Current as of March 16, 2020*
Overall, ~20% of cases are estimated to be severe/critical, requiring significant health capacity for testing and critical care infrastructure.

**Context**
- WHO estimates ~20% of COVID-19 cases are severe (requiring oxygen) or critical (requiring ventilation).
- This reflects a higher level of severity compared to influenza for instance.
- At a country level, mild cases may go undiagnosed.

**WHO estimated global distribution by severity of symptoms**

**Severity by country may vary**

**China**
- As of February 24, 2020 (~45K cases)
  - Similar mix of mild / severe / critical confirmed cases to WHO estimate
  - ~16K suspected cases were left undiagnosed, driven by testing limitations

**Italy**
- ICU admissions in first two weeks represented 16% of all patients who tested positive for COVID-19

**JAMA**
- March 3, 2020
  - 56% of patients who tested positive for COVID-19 are hospitalized
- March 10, 2020
  - ICUs almost at full capacity in Lombardy, region hardest hit by COVID-19
- March 12, 2020
  - Northern regions trying to expand ICU capacity with and 230+ ICU spots added

**Source:** JAMA, WHO March 6 reports, JAMA, WSJ and associated press interviews with Italian physicians
People 50+ in age are ~40-76% of diagnosed cases, however limited testing may skew potential case severity/volume in countries like Italy
As of data from Feb 11 in China and as of March 16 and 15 in South Korea and Italy* respectively

### Context

In all three countries, there is a significant differences in the age distribution

There is only a small percentage of cases found among the youngest populations (0-19) despite frequent contact with other individuals (school, public transport)

### Total cases by country and age segment, Percent by age segment

- **South Korea**
  - 52% 20-49
  - 32% 50-69
  - 10% Undiagnosed

- **China**
  - 44% 20-49
  - 42% 50-69
  - 12% Undiagnosed

- **Italy**
  - 37% 20-49
  - 38% 50-69
  - 1% Undiagnosed

#### Approximate age range

- **0-19**
- **20-49**
- **50-69**
- **70+**
- **Undiagnosed**

- **People over 70 make up nearly 40% of total cases in Italy compared to 10% in South Korea and 12% in China**

- **S. Korea has performed substantially more tests than Italy**

- **While Italy has 2nd oldest population in the world, they are still likely missing milder or asymptomatic case and younger cases which could impacting fatality rates**

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1. Italy reports age segments slightly differently than South Korea and China thus categories are rounded
2. Note - Data reported from ISS March 15 reports 7.2%, however latest deaths/cases from WHO indicates this may be higher
3. Note - Data reported from China Feb 11 reports 2.3%, however latest deaths/cases from WHO indicate this may be higher

Source: Korea CDC, China CDC, ISS Italian National Health Service
Case fatality rate data from three countries shows that older populations are at greater risk overall

As of data from Feb 11 in China and as of March 16 and 15 in South Korea and Italy* respectively

### Context

- WHO has estimated global case fatality rates at 3.4%
- Rates vary significantly by age, co-morbidity, health system strength and other factors

### Case fatality rate (%) by age segment

<table>
<thead>
<tr>
<th>Age range</th>
<th>South Korea</th>
<th>China</th>
<th>Italy</th>
</tr>
</thead>
<tbody>
<tr>
<td>0-9</td>
<td>0.8-0.9%</td>
<td>0.8-0.9%</td>
<td>0.8-0.9%</td>
</tr>
<tr>
<td>10-19</td>
<td>2.3-4.0%</td>
<td>2.3-4.0%</td>
<td>2.3-4.0%</td>
</tr>
<tr>
<td>20-29</td>
<td>6.8-7.2%</td>
<td>6.8-7.2%</td>
<td>6.8-7.2%</td>
</tr>
<tr>
<td>30-39</td>
<td>5.3%</td>
<td>5.3%</td>
<td>5.3%</td>
</tr>
<tr>
<td>40-49</td>
<td>12.5%</td>
<td>12.5%</td>
<td>12.5%</td>
</tr>
<tr>
<td>50-59</td>
<td>8.0%</td>
<td>8.0%</td>
<td>8.0%</td>
</tr>
<tr>
<td>60-69</td>
<td>9.3%</td>
<td>9.3%</td>
<td>9.3%</td>
</tr>
<tr>
<td>70-79</td>
<td>14.8%</td>
<td>14.8%</td>
<td>14.8%</td>
</tr>
<tr>
<td>80+</td>
<td>20.2%</td>
<td>20.2%</td>
<td>20.2%</td>
</tr>
</tbody>
</table>

**Fatalities are significantly higher for people over age 60 from the time periods reported**

The differences in fatality rates between countries overall however are likely due to a number of factors:
- South Korea’s could be lower due to expedited testing and response, while Italy’s could be higher due to population and lack of testing

**Source:** L’Istituto Superiore di Sanità (ISS) Italy, WHO, Korea CDC, China CDC

<table>
<thead>
<tr>
<th>Age range</th>
<th>Case fatality rate (%)</th>
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</thead>
<tbody>
<tr>
<td>0-9</td>
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<td>14.8%</td>
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<tr>
<td>80+</td>
<td>20.2%</td>
</tr>
</tbody>
</table>

**Fatalities may lag incremental case reporting**

---

1. Note - data reported from China Feb 11 reports 2.3%, however latest deaths/cases from WHO indicate this may be higher

**Context**

Current as of March 16, 2020
Contents

01 COVID-19
   The situation now

02 Possible future scenarios

03 Actions for companies to consider

04 Leading indicator dashboards
COVID-19 has seen a consistent case decline in countries that had experienced rapid case growth early (esp. China, South Korea).

However, cases outside of Asia are growing dramatically, driven primarily by complexes in Europe and the Middle East. The United States, while it has confirmed only a limited number of new cases, may experience a large increase in cases once testing kits become widely available.

### Scenario overview

#### The situation now

COVID-19 has seen a consistent case decline in countries that had experienced rapid case growth early (esp. China, South Korea).

However, cases outside of Asia are growing dramatically, driven primarily by complexes in Europe and the Middle East. The United States, while it has confirmed only a limited number of new cases, may experience a large increase in cases once testing kits become widely available.

#### Epidemiological scenarios

**Delayed Recovery**
- China and East Asian countries continue their current recovery and control the virus by late Q1 or early Q2 2020
- European and US case count growth rises rapidly through mid-April

**Prolonged Contraction**
- China and East Asian face a surge of re-infection as they attempt to restart economic activity
- The virus is not seasonal with a mutated virus resurging in the fall of 2020

#### Economic impacts

**China and East Asia**
- Start recovery but supply chains remain impaired
- Virus not seasonal with a mutated virus resurging in the fall of 2020
- Experience double-dip slowdowns as the economic recovery is derailed in 2020 and pushed into Q1 2021

**US and Europe**
- Large-scale quarantines, travel restrictions, and social distancing drive drop-off in consumer spending and business investment in 2020
- Experience demand-side reductions in consumer and business spending and deep recessions in 2020

Sources: World Health Organization Situation Reports, news reports, McKinsey analysis
**Delayed recovery**

The virus continues to spread across the Middle East, Europe and US until mid Q2, when virus seasonality combined with a stronger public health response drives case load reduction.
Prolonged contraction

The virus spreads globally without a seasonal decline, creating a demand shock that lasts until Q2 2021. Health systems are overwhelmed in many countries, especially the poorest, with large-scale human and economic impact.

Epidemiological scenario

European and US public health measures deliver initial containment of the virus only by early June.

The virus does not prove to be seasonal with a mutated virus resurging in the fall of 2020, leading to a spike in cases across geographies throughout Q2.

Restrictions on travel and quarantines in the US, Europe, China, and East Asia are tightened further in an attempt to stem the tide.

Iran continues to be epicenter in Middle East; South East and South Asia, Africa, and Latin America are spared worst effects due to their warm climates and young demographics.

China and East Asian countries face a surge of re-infection as a result of attempt to restart economic activity.

Economic impacts

China and East Asia experience double-dip slowdowns as the economic recovery is derailed in 2020 and pushed into Q1 2021.

The US and Europe experience demand-side reductions in consumer and business spending and deep recessions in 2020.

- Layoffs and bankruptcies in the most affected sectors rise sharply throughout 2020, feeding into a self-reinforcing downward spiral.
- Financial system distress is significant but a full-scale banking crisis averted due to better capitalization of banks and new macro-prudential supervision in place.
- Fiscal and monetary policy responses prove insufficient to break the headwinds.

The global economic impact is severe, with significant GDP contraction in most major economies in 2020 and a slow-moving recovery beginning in only Q2 2021.
A crisis nerve center can play an important role in planning and managing COVID-19 responses

Crisis nerve centers can help in situations with **three determining features:**

- A disruption or crisis requires immediate attention. It may have arrived or be imminent.
- The situation is novel due to the nature or scale of the threat, which distinguishes it from a “routine emergency.”
- The disruption is unfolding faster than the organization can understand or interpret using the usual approaches, such as an extensive strategic study.

COVID-19 fits these criteria, so a nerve center may help companies quickly assess the situation and consider and choose plans of action, and execute those plans.

When standing up a nerve center, consider **four key actions:**

- **Discover** an accurate view of the situation through multi-source “listening posts,” assess how it might evolve, and derive implications for the organization.
- **Design** a trigger-based portfolio of actions – immediate and strategic – with a pragmatic operating model to develop detailed plans and act on them.
- **Decide** on strategic actions quickly after stress-testing of hypotheses and alternatives, and ensuring adherence to company and societal values.
- **Deliver** in a disciplined, efficient way, keeping sufficient flexibility to adapt to the changing landscape.
Example COVID-19 Response Structure: 5 teams, 18 workstreams
Based on discussions with risk and health professionals and more than 200 companies across sectors

<table>
<thead>
<tr>
<th>COVID-19 Integrated Nerve Center</th>
<th>A Workforce protection</th>
<th>B Supply Chain Stabilization</th>
<th>C Customer engagement</th>
<th>D Stress-test financials</th>
<th>E Operate nerve center</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Policy &amp; Management</td>
<td>Portfolio of policies and actions incl. prevention and incident response</td>
<td>Supplier engagement</td>
<td>Cross-tier risk transparency</td>
<td>B2B transparency</td>
<td>Comms to B2B customers (e.g., microsite)</td>
</tr>
<tr>
<td>2 Two Way Communication</td>
<td>Multi-channel communications</td>
<td>Inventory management</td>
<td>Critical part identification</td>
<td>Customer protection</td>
<td>Prevention interventions across customer journey</td>
</tr>
<tr>
<td>3 Personnel &amp; contractors</td>
<td>Tiering (all/some/no WFH)</td>
<td>Production &amp; Operations</td>
<td>Operational impact assessment</td>
<td>Customer outreach</td>
<td>Cust. team training</td>
</tr>
<tr>
<td>4 Facility &amp; On-site norms</td>
<td>Staggering work shifts/times</td>
<td>Demand management</td>
<td>Production capacity optimization</td>
<td>Scenario definition</td>
<td>Customer comms re: COVID-practices</td>
</tr>
<tr>
<td>5 Health &amp; Govt engagement</td>
<td>Local &amp; federal regulators and public health officials</td>
<td>Logistics</td>
<td>S&amp;OP SKU-level demand signal estimates by macro scenario</td>
<td>Financial stress tests</td>
<td>Financials in different scenarios, especially working capital requirements</td>
</tr>
</tbody>
</table>

- **Workforce protection**
  - 1. Policy & Management
  - 2. Two Way Communication
  - 3. Personnel & contractors
  - 4. Facility & On-site norms
  - 5. Health & Govt engagement

- **Supply Chain Stabilization**
  - 1. Supplier engagement
  - 2. Inventory management
  - 3. Production & Operations
  - 4. Demand management
  - 5. Logistics

- **Customer engagement**
  - 1. B2B transparency
  - 2. Customer protection
  - 3. Customer outreach

- **Stress-test financials**
  - 1. Scenario definition
  - 2. Financial stress tests

- **Operate nerve center**
  - 1. Issue map & management
  - 2. Portfolio of actions
  - 3. Leadership alignment

Based on discussions with risk and health professionals and more than 200 companies across sectors.
Example Nerve center for a pandemic response

<Real sanitized example>

1. Includes procurement, supply chain, and logistics
# A: Organizations should consider how to protect their workforce

Overall policies should consider safety first, especially for high risk individuals, as well as how to maintain business operations. These should be in-line with local health authority guidance and regulatory requirements.

## Checklist of things to consider

| I. Policy & Management | 1. Develop policies which adhere to public health recommendations and workplace laws, including on sick leave, as well as business priorities/continuity  
2. Set policies for **remote working and who can access the workplace** at what times (e.g., staggering shifts, business-critical employees on site only)  
3. Set **sign off processes** for policy changes |
| --- | --- |
| II. Two way Communication | 1. Select **communication channels** and set protocols to communicate early and often  
2. Develop approach for **cascaded communications** to provide clarity and direction  
3. Establish **two-way communication** and confidential reporting for employees  
4. Use **official authorities** for information (e.g., WHO and CDC) |
| III. Personnel & contractors | 1. Identify and tier **critical functions** and roles, including back-office functions  
2. Assess **infrastructure needs** for remote working or other flexible models (e.g., VPN, broadband, laptops, remote desktop, etc.); consider piloting / testing system first to learn and adapt (e.g., everyone on multi-day pilot, remote desktop trials with subset of employees)  
3. Adapt **reporting and sign off processes** to reduce loss of productivity (e.g., devolved responsibility); consider training managers on how to manage remotely  
4. Agree on **adaptations required for collective bargaining units** (e.g., unions, int’l work councils)  
5. Agree on policies and incentives with **contractors** |
| IV. Workplace & norms | 1. Implement physical mechanisms to **reduce transmission** (e.g., cleaning, staggering shifts)  
2. Communicate with site leaders / N-1 leaders to **clarify accountability and authority** (e.g., WFH) – err on side of agile and localized decision-making  
3. Define **contingency plans** for workplace closures (e.g., seating capacity in other buildings) |
| V. Health and Govt engagement | 1. Engage with **health officials** to assess risk and response  
2. Collaborate with healthcare **providers and payors** to access appropriate care for individuals (e.g., health plan hotline)  
3. Collaborate with appropriate **government officials** and other regulatory bodies to inform and implement policies |

Current as of March 16, 2020
A: Across these areas organizations are taking a range of actions
Examples of actions

<table>
<thead>
<tr>
<th>Basic</th>
<th>Moderate (includes Basic)</th>
<th>Extensive (includes Basic and Moderate)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>I. Policies &amp; Management</strong></td>
<td><strong>II. Two way Communication</strong></td>
<td><strong>III. Personnel</strong></td>
</tr>
<tr>
<td>Remind employees of sick policy and adapt as needed</td>
<td>Publish communications (regularly and in response to major events)</td>
<td>Provide work from home options and infrastructure where feasible</td>
</tr>
<tr>
<td>Circulate guidelines for employees who recently travelled to high risk areas or display symptoms</td>
<td>including who to contact with questions, policies on remote working and travel, and resources on hygiene and health; assign multidisciplinary commts. leads to control messaging across functions</td>
<td>Send tips on remote working</td>
</tr>
<tr>
<td>Choose a lead and set a process to review policies</td>
<td>Post hand-washing instructions and other hygiene resources in visible locations such as bathrooms</td>
<td>Collaborate with contractors on planning for outbreak</td>
</tr>
<tr>
<td>Ask all locations to assess their risk and define potential actions</td>
<td></td>
<td>Provide personal protective gear for select frontline workers where appropriate (e.g., healthcare professionals)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>IV. Workplace &amp; norms</strong></th>
<th><strong>Health &amp; Govt Engagement</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Identify and reduce risk factors for transmission (e.g. shared tools)</td>
<td>Review WHO and local regulatory guidelines</td>
</tr>
<tr>
<td>Sanitize common areas and workspace more frequently</td>
<td>Identify nearest healthcare providers / testing sites and collaborate with health insurers</td>
</tr>
<tr>
<td>Provide hygiene supplies in key areas and encourage handwashing</td>
<td>Develop a risk assessment in partnership with a health professional</td>
</tr>
<tr>
<td>Limit cafeteria style food and communal snacks</td>
<td>Establish testing protocol with local regulatory bodies</td>
</tr>
<tr>
<td>Increase ventilation by opening windows and ensuring filters are replaced where needed</td>
<td>Conduct periodic testing with agency</td>
</tr>
<tr>
<td>Encouraged non-handshake greetings &amp; social distancing</td>
<td></td>
</tr>
<tr>
<td>Limit meeting sizes / conduct virtual meetings</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Basic</strong></th>
<th><strong>Moderate (includes Basic)</strong></th>
<th><strong>Extensive (includes Basic and Moderate)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Remind employees of sick policy and adapt as needed</td>
<td>Expand sick leave policy and primary caregiver policy</td>
<td>Quarantine affected employees including C-suite leadership</td>
</tr>
<tr>
<td>Circulate guidelines for employees who recently travelled to high risk areas or display symptoms</td>
<td>Restrict non-essential travel as well large gatherings</td>
<td>Develop specific policies limiting gatherings to X number of people</td>
</tr>
<tr>
<td>Choose a lead and set a process to review policies</td>
<td>Prepare detailed guidance for functions on regulatory requirements</td>
<td>Collaborate with industry colleagues to share best practices</td>
</tr>
<tr>
<td>Ask all locations to assess their risk and define potential actions</td>
<td>Develop C-1 and C-2 contingency plans</td>
<td></td>
</tr>
</tbody>
</table>

**Source:** Press search, organization interviews

**Current as of March 16, 2020**
A: Organizations should consult official health sources for information, guidance, and tools

Examples provided; Please check online for latest information

**WHO**

Situation reports and information examples

[Link to WHO situation reports and information examples](https://www.who.int/news-room/q-a-detail/q-a-coronaviruses)

[Link to WHO situation reports and information examples](https://www.who.int/docs/default-source/coronaviruse/situation-reports/20200310-sitrep-50-covid-19.pdf?sfvrsn=56e904fb_2)

**CDC**

Overall prevention, business guidance, and industry guidance examples

[Link to CDC overall prevention, business guidance, and industry guidance examples](https://www.cdc.gov/coronavirus/2019-ncov/about/prevention.html)


**Local health authorities & adapted info**

Overall information, business guidance, public poster examples

[Link to Local health authorities & adapted info overall information, business guidance, public poster examples](https://www.nhs.uk/conditions/coronavirus-covid-19/)


Source: CDC, WHO, NHS, SF Public Health Dept

Current as of March 16, 2020
A: Policies & Management

Organizations should develop company-wide policies to each of these scenarios and work with local leaders to tailor/adapt.

- **Sick family member**
  An employee indicates that their family member recently tested positive for COVID-19 and they were exposed.
  They also recently attended the latest company retreat.

- **Exposure on the line**
  One employee on the floor or call center tested positive for COVID-19.
  At least 20 other individuals were exposed including some temp agents.

- **Workforce on sick leave**
  After a recent exposure, the next day 60% of the workforce call in sick.
  Critical functions are now at risk.

- **Colleague may be sick**
  Employee observes that a colleague is starting to exhibit symptoms of illness; they have an underlying health condition and request to WFH.

- **Workforce remote**
  Company has made decision to make all employees in a site work remotely.
  All critical functions are being performed remotely, for the first time.

- **C-Suite symptoms**
  The CEO and CFO both recently came down with possible symptoms.
  They are both in the same location, yet offices exist around the world.
B: There are multiple end-to-end immediate supply chain actions to consider in response to COVID-19

1. Create transparency on multi-tier SC
   - Determine critical components, and determine origin of supply
   - Assess interruption risk and identify likely Tier 2+ risk
   - Look to alternative sources if suppliers in severely affected regions

2. Analyze available inventory
   - Estimate inventory along the value chain, including spare parts/ re-manufactured stock
   - Use after sales stock as bridge to keep production running

3. Optimize production and distribution capacity
   - Assess impact on operations and available resource capacity (mainly workforce)
   - Ensure employee safety and clearly communicate with employees
   - Conduct scenario planning and assess impact on operations based on available capacity

4. Estimate realistic final customer demand
   - Work with S&OP to get demand signal to determine required supply
   - Leverage direct communication channels with direct customer
   - Use market insights/external databases to estimate for customer’s customers

5. Leverage available logistics capacity
   - Estimate available logistics capacity for air/sea/road/rail
   - Accelerate customs clearance
   - Change mode of transport and pre-book air / rail capacity given current exposure
   - Collaborate with all parties to jointly leverage freight capacity
B: Supply chain actions to consider in the next two to four months

- Evaluate alternative sourcing for all materials impacted – availability of suppliers, additional cost due to logistics, tariffs, estimated component price increases
- Enhance the demand verification process to correct inflated demand to mitigate the whiplash effect
- Provide continuous support to small and mid-sized tier 2-3 suppliers in financial trouble
- Assess regional risks for current and backup suppliers
- Establish a supply chain risk function
- Digitize process and tools to integrate demand, supply, and capacity planning
- Trigger the new supply network design for resilience
- Codify the processes and tools created during the crisis management as formal documentation
- Convert war room into a reliable risk management process
- Work with public agencies to explore opportunities for support
- Engage investors and other stakeholders to improve transparency and get help

Current as of March 16, 2020
Contents

01 COVID-19
   The situation now

02 Possible future scenarios

03 Actions for companies to consider

04 Leading indicator dashboards
Supply chains are being disrupted around the world, but the full impacts have not yet been felt.

### Supply – production

- **80% plants restarted**
  Across China, ex-Hubei, with large enterprises restarting, albeit with ~60% capacity, at much higher rate than smaller ones.

- **2M idle containers**
  8.8% of global container capacity affected by reduced demand.

### Logistics – transportation

- **60% China flights suspended**
  Commercial flights account for ~50% of air cargo capacity, some airlines converting flights for cargo.

- **52% BDI increase**
  Baltic Dry Index2 52% higher since CLNY3 but at same level as Feb 2019.

### Customer demand

- **90% decline in car sales**
  China consumer sentiment sharply lower; online/express deliveries up.

### Situation today

<table>
<thead>
<tr>
<th>Impact</th>
<th>High</th>
<th>Medium</th>
<th>Low</th>
</tr>
</thead>
</table>

### What to expect

- **MED**
  Parts and labor shortages leading to further SC disruptions (e.g., decreased production capacity).
  Other regions will be facing production capacity reductions.
  Customer pressure for prioritization.

- **7,000 TEU/wk reduction**
  Volumes will return as factories restart, may see peak for restocks.
  Future capacity 2.3% reduction for a Asia-US route from May due to sea freight alliance revisions.

- **5% global air traffic decrease**
  Decline in capacity available due to travel ban on commercial flights.
  YoY global air freight belly capacity reduction of 14% in March 2020.
  Rates likely to continue to increase.

- **MED**
  Impact on freight will take an extended period of time to correct with slower ramp-up.
  Logistics capacity returns but faces constraints; near-term price increases.

1. Assessment of risk premium to ship raw materials on a number of shipping routes, data as of 3/13.
2. Frankfurt (FRA) to Shanghai (PVG) used as a proxy.
4. Estimated prior to implementation of EU-US travel ban.
5. Commercial flights from China.
6. Companies such as Cathay Pacific and Singapore Airlines now starting to fly empty passenger aircrafts as dedicated cargo planes.

Source: Baidu, WSJ, Bloomberg, Alphaliner, Quartz, TAC index, IATA, Seabury Consulting, A.P. Moller-Maersk Group of Denmark, Agility Logistics.

Current as of March 16, 2020.
COVID-19 Leading indicator dashboard
Propagation of COVID-19 across new transmission complexes

- South-Asia (ex-China)¹
- Europe
- Middle East²
- Americas

¹ Includes Western Pacific (excl China) and South-East Asia WHO regions
² Eastern-Mediterranean WHO region
Note: All countries or regions have documented 3rd generation cases

Source: WHO Situation Reports, TomTom traffic index, Baidu QianXi, CDC, IATA, BBC, NYT, Japan Times, NPR, Reuters, press research

Current as of March 16, 2020
COVID-19 Leading indicator dashboard for China
Tracking toward economic restart

Hubei impact
How deep is the impact, and when could economic activity restart?

- Late Q2: Hubei remains deeply impacted; return to economic activity tough to foresee until mid Q2

Recovery milestones
- Steady decline in confirmed cases
- New suspected and confirmed cases rates consistent with other provinces
- Quarantine lifted
- Public transport resumes
- Factory activity returns to pre-outbreak levels

Daily infection rate, per million
- Steady decline in confirmed cases:
  - Jiangsu: 7
  - Shandong: 4
  - Zhejiang: 7
  - Guangdong: 9
  - Wuhan: 8

Crude case fatality ratio
- >4x:
  - Jiangsu: 11
  - Shandong: 6
  - Zhejiang: 7
  - Guangdong: 8
  - Wuhan: 8

Small businesses face more labor disruption

Labor availability (movement of workers to major industrial provinces)
- Steady decline in confirmed cases:
  - Jiangsu: 7
  - Shandong: 4
  - Zhejiang: 7
  - Guangdong: 9
  - Wuhan: 8

China economic restart
When could economic activity restart in China (ex-Hubei)?

- Late Q1: Restart has begun, especially for larger companies, despite challenges such as labor shortages and movement of goods

Labor availability (movement of workers to major industrial provinces)
- Steady decline in confirmed cases:
  - Jiangsu: 7
  - Shandong: 4
  - Zhejiang: 7
  - Guangdong: 9
  - Wuhan: 8

Return to work index (largest manufacturing cities by output in mainland China)
- Steady decline in confirmed cases:
  - Jiangsu: 7
  - Shenzhen: 54%
  - Shanghai: 57%
  - Zhejiang: 7
  - Shenzhen: 50%
  - Guangdong: 9
  - Wuhan: 18%

Air pollution (NO₂ level)
- Steady decline in confirmed cases:
  - 32% decline in Beijing
  - 24% decline in Shenzhen

PMI manufact.
- Steady decline in confirmed cases:
  - 14pt decline in Feb

China consumer confidence
When will Chinese consumer confidence and purchasing activity return?

- Q2: Consumer spending in China spend may lag behind economic restart

Congestion in major cities
- Earliest school restarts
  - Shenzhen: 90%
  - Beijing: 65%
  - Shanghai: 64%
  - Nanjing: 80%
  - Wuhan: 6%

Example consumer behavior metrics (anecdotal)
- Retail passenger car sales down 92%
- Smartphone sales down 37%
- Spending on food & drinks down $60B in Jan and Feb
- Hotel occupancy down 80%


Current as of March 16, 2020
## Middle East

<table>
<thead>
<tr>
<th>Example country</th>
<th>Epidemiological Indicators</th>
<th>Economic/policy indicators</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Date of initial case</td>
<td>Total number of cases</td>
</tr>
<tr>
<td>Iran</td>
<td>02/20</td>
<td>12,729</td>
</tr>
<tr>
<td>Rest of region</td>
<td>02/15</td>
<td>1,221</td>
</tr>
</tbody>
</table>

### Current phase

- **Stage 1**: Small number of cases identified; no sustained local transmission
- **Stage 2**: Disease spread and sustained local transmission
- **Stage 3**: Government action and shifts in public behavior. Not all affected regions enter stage 3, but interventions and economic impacts signal prolonged recovery
- **Stage 4**: Case growth and stretched health systems
- **Stage 5**: New cases drop, activity resumes

### CDC travel health notice

- **Warning Level 3**: 03/16/2019
- **Alert Level 2**: 03/16/2020
- **None**: 03/16/2020

### Traffic congestion

- 03/16/2020

Source: WHO Situation Reports, TomTom traffic index, Baidu QianXi, CDC, IATA, BBC, NYT, Japan Times, NPR, Reuters, press research
## Europe

### Current phase

**Stage 1:** Small number of cases identified; no sustained local transmission

**Stage 2:** Disease spread and sustained local transmission

**Stage 3:** Government action and shifts in public behavior. Not all affected regions enter stage 3, but interventions and economic impacts signal prolonged recovery

**Stage 4:** Case growth and stretched health systems

**Stage 5:** New cases drop, activity resumes

### Epidemiological Indicators

<table>
<thead>
<tr>
<th>Country</th>
<th>Date of initial case</th>
<th>Total number of cases</th>
<th>New cases in last 14 days</th>
<th>5-day new case trend</th>
<th>Crude case fatality ratio</th>
<th>Peak case count observed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Italy</td>
<td>01/31</td>
<td>21,157</td>
<td>20,029</td>
<td>157, 281, 299, 3497, 2,313</td>
<td>6.8%</td>
<td>N</td>
</tr>
<tr>
<td>France</td>
<td>01/25</td>
<td>4,469</td>
<td>4,369</td>
<td>372, 495, 591, 780, 829</td>
<td>2.0%</td>
<td>N</td>
</tr>
<tr>
<td>Germany</td>
<td>01/28</td>
<td>3,795</td>
<td>3,738</td>
<td>157, 281, 299, 3497, 2,313</td>
<td>0.2%</td>
<td>N</td>
</tr>
<tr>
<td>Spain</td>
<td>02/01</td>
<td>5,753</td>
<td>5,708</td>
<td>615, 501, 825, 1,266, 1,322</td>
<td>2.4%</td>
<td>N</td>
</tr>
<tr>
<td>Rest of region</td>
<td>01/29</td>
<td>9,900</td>
<td>9,754</td>
<td>977,1125, 2,086, 2,222</td>
<td>0.6%</td>
<td>N</td>
</tr>
</tbody>
</table>

### Economic/policy indicators

<table>
<thead>
<tr>
<th>Number of countries/territories restricting travel</th>
<th>Number of airlines suspending service to country</th>
<th>Traffic congestion</th>
<th>School closures</th>
</tr>
</thead>
<tbody>
<tr>
<td>106</td>
<td>94</td>
<td>74</td>
<td>Country-wide</td>
</tr>
<tr>
<td>55</td>
<td>55</td>
<td>74</td>
<td>Country-wide</td>
</tr>
<tr>
<td>52</td>
<td>52</td>
<td>74</td>
<td>Local</td>
</tr>
<tr>
<td>49</td>
<td>49</td>
<td>74</td>
<td>Country-wide</td>
</tr>
</tbody>
</table>

### CDC travel health notice

- **Alert Level 2:** None

### Traffic congestion

- **Warning Level 3:** None
- **Alert Level 2:** None

---

Source: WHO Situation Reports, TomTom traffic index, Baidu QianXi, CDC, IATA, BBC, NYT, Japan Times, NPR, Reuters, press research
## Example country

<table>
<thead>
<tr>
<th>Country</th>
<th>Date of initial case</th>
<th>Total number of cases</th>
<th>New cases in last 14 days</th>
<th>5-day new case trend</th>
<th>Crude case fatality ratio</th>
<th>Peak case count observed</th>
<th>Number of airlines suspending service to country</th>
<th>Number of countries/territories restricting travel</th>
<th>Traffic congestion</th>
<th>School closures</th>
<th>CDC travel health notice</th>
</tr>
</thead>
<tbody>
<tr>
<td>US</td>
<td>01/23</td>
<td>1,678</td>
<td>1,616</td>
<td>[224 291 277 414 0]</td>
<td>2.4%</td>
<td>N</td>
<td>28</td>
<td>28</td>
<td>59</td>
<td>Local</td>
<td>Warning Level 3</td>
</tr>
<tr>
<td>Rest of region</td>
<td>01/27</td>
<td>699</td>
<td>677</td>
<td>[49 16 105 245]</td>
<td>0.7%</td>
<td>N</td>
<td></td>
<td></td>
<td>16</td>
<td></td>
<td>Alert Level 2</td>
</tr>
</tbody>
</table>

## Current phase

- **Stage 1**: Small number of cases identified; no sustained local transmission
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- **Stage 4**: Case growth and stretched health systems
- **Stage 5**: New cases drop, activity resumes

**CDC travel health notice**

- **Warning Level 3**
- **Alert Level 2**
- **None**

**Traffic congestion**

- 03/16/2019
- 03/16/2020

Source: WHO Situation Reports, TomTom traffic index, Baidu QianXi, CDC, IATA, BBC, NYT, Japan Times, NPR, Reuters, press research
South-Asia (ex-China)

Example country | Epidemiological Indicators
---|---
South Korea | 
Date of initial case: Prior to 01/20 | Total number of cases: 8,162 | New cases in last 14 days: 4,426 | 5-day new case trend: 242 | Crude case fatality ratio: 0.9% | Peak case count observed: N

Japan | 
Date of initial case: Prior to 01/20 | Total number of cases: 780 | New cases in last 14 days: 541 | 5-day new case trend: 54 | Crude case fatality ratio: 2.8% | Peak case count observed: N

Singapore | 
Date of initial case: 01/24 | Total number of cases: 212 | New cases in last 14 days: 110 | 5-day new case trend: 5 | Crude case fatality ratio: 0% | Peak case count observed: N

Rest of region | 
Date of initial case: Prior to 01/20 | Total number of cases: 1,033 | New cases in last 14 days: 906 | 5-day new case trend: 87 | Crude case fatality ratio: 1.1% | Peak case count observed: N

Current phase
- **Stage 1:** Small number of cases identified; no sustained local transmission
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- **Stage 4:** Case growth and stretched health systems
- **Stage 5:** New cases drop, activity resumes

CDC travel health notice: 
- Warning Level 3
- Alert Level 2
- None

Traffic congestion:
- **03/16/2019**
- **03/16/2020**

Source: WHO Situation Reports, TomTom traffic index, Baidu QianXi, CDC, IATA, BBC, NYT, Japan Times, NPR, Reuters, press research
References

COVID-19 Leading indicator dashboard for China

1. Case fatality ratio calculated as (deaths on day X) / (cases on day X). Previous versions of this dashboard calculated CFR = (deaths on day X)/(cases on day X-7) to account for incubation.
2. Measures movement of population into destinations as of 3/15/2020
3. Wuhan included only for comparison
4. 7-day average (9-Mar to 16-Mar) compared to 2019
5. Car traffic only. Congestion reflects % increase in travel time compared to free-flow conditions

Note: All countries and regions have documented third-generation cases

Region-specific details

1. Case fatality rate calculated as (deaths on day X) / (cases on day X). Dashboards before February 29 calculated CFR as (deaths on day X)/(cases on day X-7) to account for incubation.
2. Assessment based on observed stoppage in growth of cases and medical community's opinion validated by external sources
3. Anecdotal reports of airline suspensions based on press searches
5. 0 new reported cases in US on 3/15 likely a reporting anomaly and not indicative of overall trend
6. Crude case fatality ratio likely to fall as testing becomes more widely available
7. Epidemiological data current as of 3/15 WHO Situation Report

Note: All countries or regions have documented third-generation cases