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People Analytics: Using Digital Exhaust from the Web to Leverage Network Insights in the Workplace

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Supported by NSF Grant # 2027572 RAPID: Teaming in the Time of COVID-19: Understanding how technology affordances can enable collaboration during sudden workplace disruption

with Paul Leonardi
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SONIC ATLAS ADVANCING TEAMS, LEADERS, & SYSTEMS

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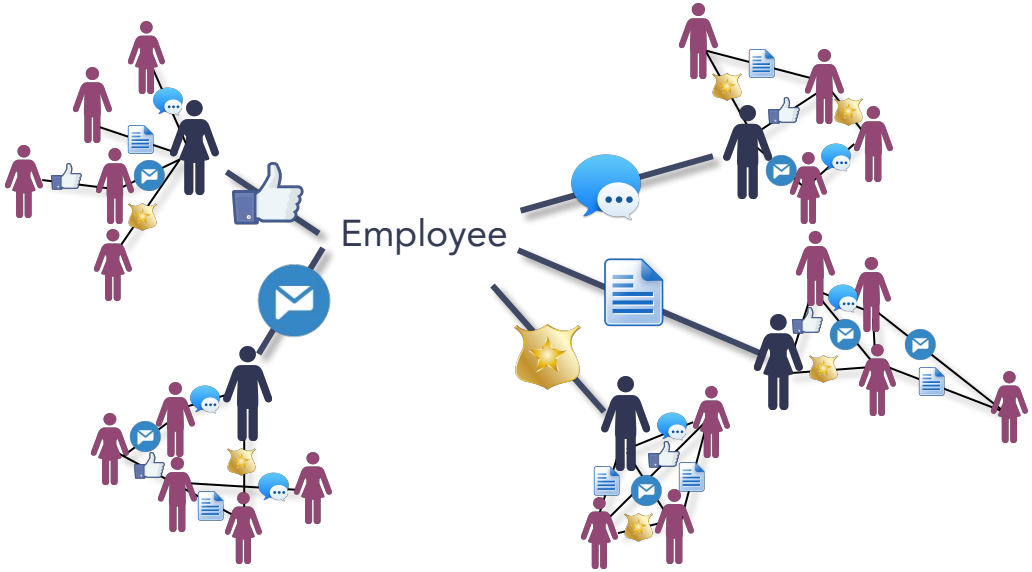
Better PEOPLE Analytics

Measure Who THEY KNOW, *Not Just Who* THEY ARE.

Illustrations by **ANDY GILMORE**

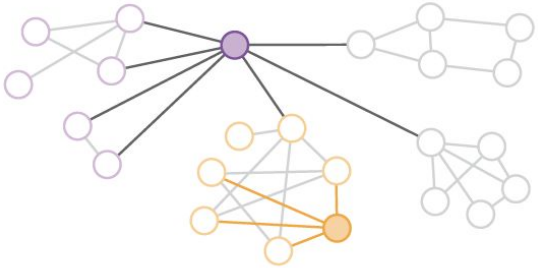
Activity Networks from Digital Exhaust Data



STRUCTURAL

Ideation Signature

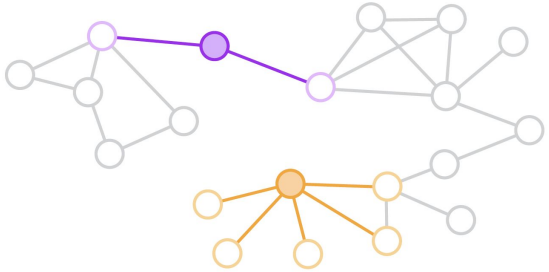
FOCUS: Individual • **PREDICTS:** Which employees will come up with good ideas



*Purple shows **low constraint:** He communicates with people in several other networks besides his own, which makes him more likely to get novel information that will lead to good ideas. Orange, who communicates only with people within his network, is less likely to generate ideas, even though he may be creative.*

Influence Signature

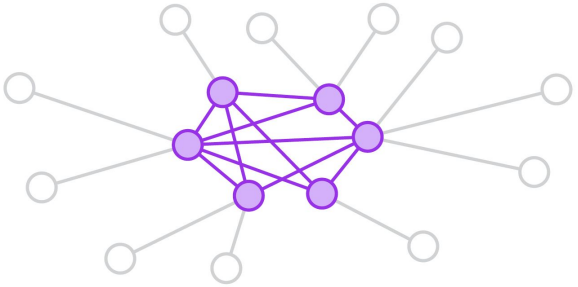
FOCUS: Individual • **PREDICTS:** Which employees will change others' behavior



*Though she connects to only two people, purple is more influential than orange, because purple's connections are better connected. Purple shows **higher aggregate prominence.** Orange may spread ideas faster, but purple can spread ideas further because her connections are more influential.*

Efficiency Signature

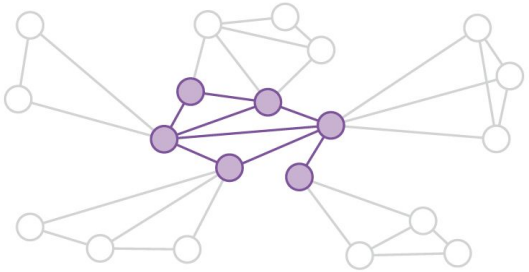
FOCUS: Team • **PREDICTS:** Which teams will complete projects on time



*The purple team members are deeply connected with one another—showing **high internal density.** This indicates that they work well together. And because members' external connections don't overlap, the team has **high external range,** which gives it greater access to helpful outside resources.*

Innovation Signature

FOCUS: Team • **PREDICTS:** Which teams will innovate effectively



*Purple team members aren't deeply interconnected; their team has **low internal density.** This suggests they'll have different perspectives and more-productive debates. The members also have **high external range**, or wide, diverse connections, which will help them gain buy-in for their innovations.*

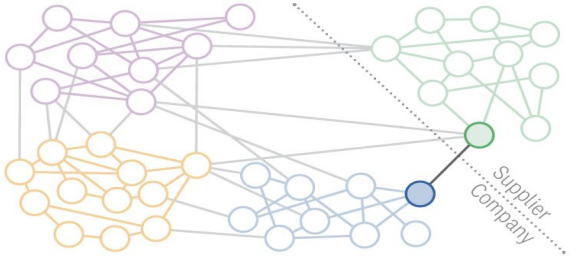
Silo Signature

FOCUS: Group • **PREDICTS:** Whether an organization is siloed

*Each color indicates a department. People within the departments are deeply connected, but only one or two people in any department connect with people in other departments. The groups' **modularity**—the ratio of internal to external communication—is high.*

Vulnerability Signature

FOCUS: Organization • **PREDICTS:** Which employees the organization can't afford to lose



Green is a critical external supplier to company departments blue, purple, and orange. Six people at the company have relationships with green, but 30 people rely on those relationships—which puts the company at risk. If blue's one connection to green leaves, for example, the department will be cut off from the supplier. While his title may not reflect his importance, that employee is vital to information flow.

So why ….
is Organizational Network Analytics not used more?

Survey data is...

- Time consuming
- Elicit low response rates
- Are rapidly obsolete

So what if ?

We could have survey data …

- ~~Time consuming~~ **At minimal cost**
- ~~Elicit low response rates~~ **With 100 response rate**
- ~~Are rapidly obsolete~~ **Updated 24/7**

circuit
by unify

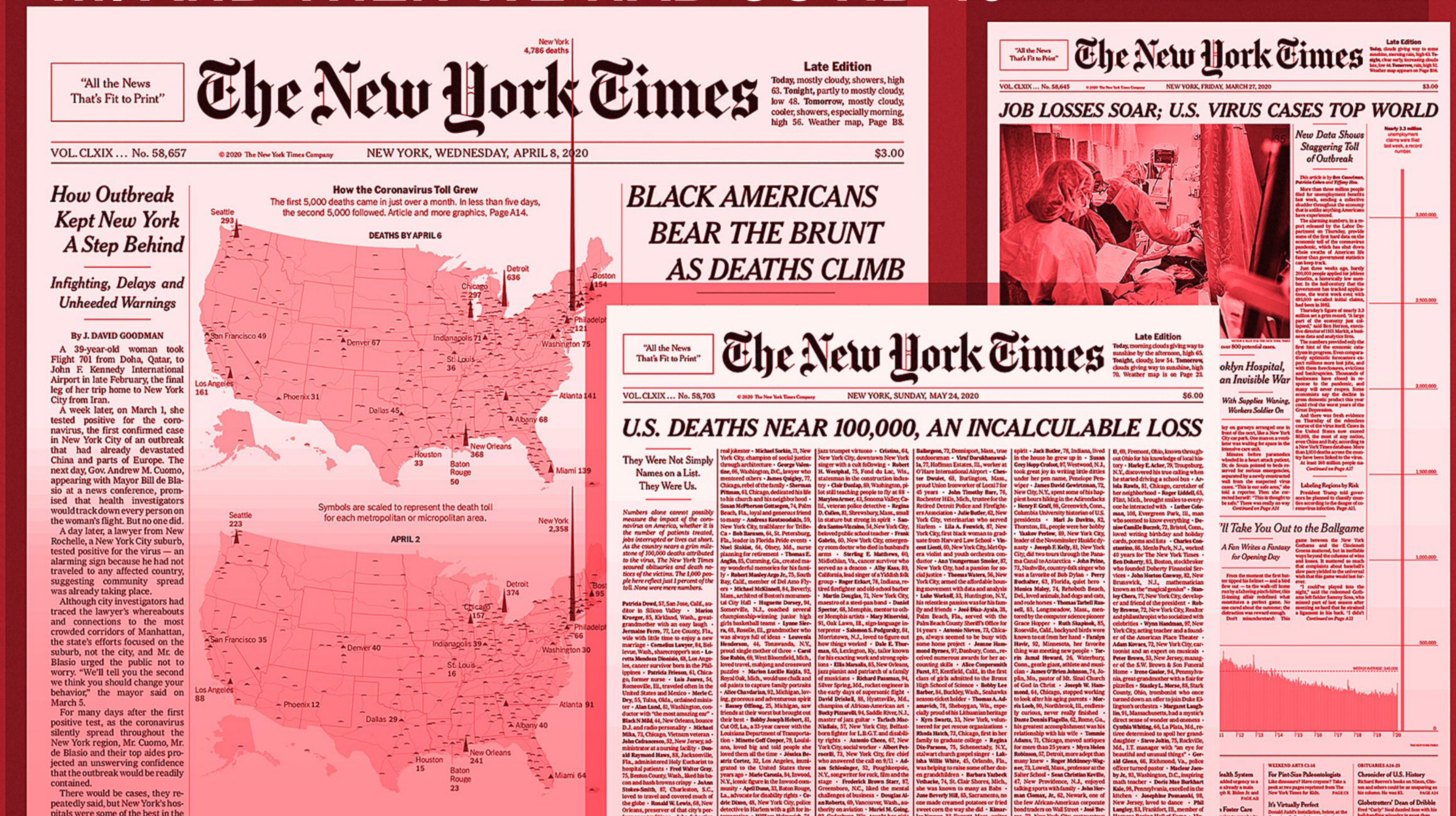
Make your
teamwork better.

ORIGINAL OBJECTIVE

- Starting in 2019, we collected survey and digital trace data from 5 companies in the US and China
  - ***Original Question****:* Can we predict survey network responses using digital trace data?

We can!

…. AND THEN WE HAD COVID-19



"All the News That's Fit to Print"

The New York Times

Late Edition

Today, mostly cloudy, showers, high 63. Tonight, partly to mostly cloudy, low 48. Tomorrow, mostly cloudy, cooler, showers, especially morning, high 56. Weather map, Page B8.

VOL. CLXIX … No. 58,657 © 2020 The New York Times Company NEW YORK, WEDNESDAY, APRIL 8, 2020 $3.00

How Outbreak Kept New York A Step Behind

Infighting, Delays and Unheeded Warnings

By J. DAVID GOODMAN

A 39-year-old woman took Flight 701 from Doha, Qatar, to John F. Kennedy International Airport in late February, the final leg of her trip home to New York City from Iran.

A week later, on March 1, she tested positive for the coronavirus, the first confirmed case in New York City of an outbreak that had already devastated China and parts of Europe. The next day, Gov. Andrew M. Cuomo, appearing with Mayor Bill de Blasio at a news conference, promised that health investigators would track down every person on the woman's flight. But no one did.

A day later, a lawyer from New Rochelle, a New York City suburb, tested positive for the virus — an alarming sign because he had not traveled to any affected country, suggesting community spread was already taking place.

Although city investigators had traced the lawyer's whereabouts and connections to the most crowded corridors of Manhattan, the state's efforts focused on the suburb, not the city, and Mr. de Blasio urged the public not to worry. "We'll tell you the second we think you should change your behavior," the mayor said on March 5.

For many days after the first positive test, as the coronavirus silently spread throughout the New York region, Mr. Cuomo, Mr. de Blasio and their top aides projected an unswerving confidence that the outbreak would be readily contained.

There would be cases, they repeatedly said, but New York's hospitals were some of the best in the

How the Coronavirus Toll Grew

The first 5,000 deaths came in just over a month. In less than five days, the second 5,000 followed. Article and more graphics, Page A14.

Symbols are scaled to represent the death toll for each metropolitan or micropolitan area.

BLACK AMERICANS BEAR THE BRUNT AS DEATHS CLIMB

"All the News That's Fit to Print"

The New York Times

Late Edition

VOL. CLXIX … No. 58,645 NEW YORK, FRIDAY, MARCH 27, 2020 $3.00

JOB LOSSES SOAR; U.S. VIRUS CASES TOP WORLD

New Data Shows Staggering Toll of Outbreak

"All the News That's Fit to Print"

The New York Times

Late Edition

Today, morning clouds giving way to sunshine by the afternoon, high 65. Tonight, cloudy, low 54. Tomorrow, clouds giving way to sunshine, high 70. Weather map is on Page 23.

VOL. CLXIX … No. 58,703 © 2020 The New York Times Company NEW YORK, SUNDAY, MAY 24, 2020 $6.00

U.S. DEATHS NEAR 100,000, AN INCALCULABLE LOSS

They Were Not Simply Names on a List. They Were Us.

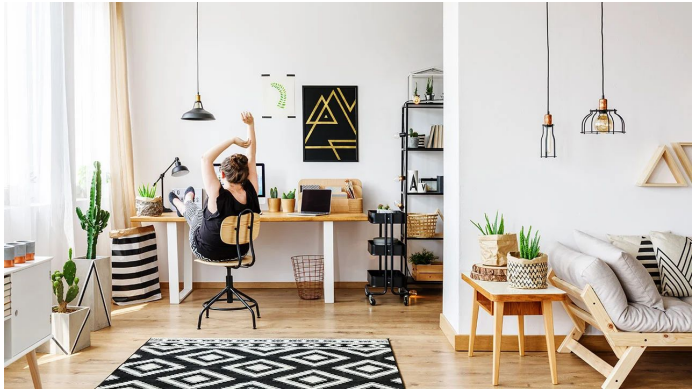
Numbers alone cannot possibly measure the impact of the coronavirus on America, whether it is the number of patients treated, jobs interrupted or lives cut short. As the country nears a grim milestone of 100,000 deaths attributed to the virus, The New York Times scoured obituaries and death notices of the victims. The 1,000 people here reflect just 1 percent of the toll. None were mere numbers.

I'll Take You Out to the Ballgame

A Fan Writes a Fantasy for Opening Day

Welcome to the 2020 Worldwide Experiment in Virtual Teaming

Imagine...



"One day some 32,000 employees stayed home. They weren't sick or on strike. Employees ranging from the CEO to phone operators were part of an experiment that involved 100,000 people. It's purpose? To explore how far a vast organization could go in transforming the workplace..."

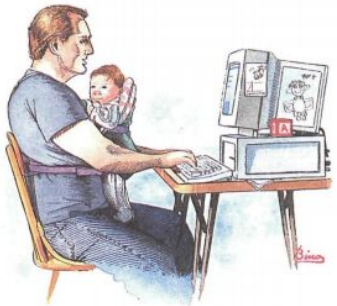
From sharing desks to telecommuting, more employees than ever before are working in nontraditional ways, and organizations are beginning to reap the benefits.

THE ALTERNATIVE WORKPLACE: CHANGING WHERE AND HOW PEOPLE WORK

BY MAHLON APGAR, IV

ON SEPTEMBER 20, 1994, some 32,000 AT&T employees stayed home. They weren't sick or on strike. They were telecommuting. Employees ranging from the CEO to phone operators were part of an experiment that involved 100,000 people. It's purpose? To explore how far a vast organization could go in transforming the workplace by moving the work to the worker instead of the worker to work.

Today AT&T is just one among many organizations pioneering the *alternative workplace* (AW) – the combination of nontraditional work practices, settings, and locations that is beginning to supplement traditional offices. This is not a fad. Although estimates vary widely, some 30 million to 40 million people in the United States are now either telecommuters or home-based workers.



What motivates managers to examine how people spend their time at the office and where else they could work? The most obvious reason is cost reduction. Since 1991, AT&T has freed up some $550 million in cash flow – a 30% improvement – by eliminating offices people don't need, consolidating others, and reducing related overhead costs. Through an AW program called the Mobility Initiative, IBM is saving more than $100 million annually in its North America sales and distribution unit alone.

Another reason is the potential to increase productivity. Employees in the alternative workplace tend to devote less time and energy to typical office routines and more to customers. At IBM, a survey of employees in the Mobility Initiative revealed that 87% believe that their personal productivity and effectiveness on the job have increased significantly.

HBR circa 1998

Northwestern University

SONIC ATLAS ADVANCING TEAMS, LEADERS, & SYSTEMS

A NATURAL EXPERIMENT

- 5 companies in the US and China
- ***Original Question****:* Can we predict survey network responses using digital trace data? ***(We can!)***
- ***COVID-19 Question:*** How does work networks change from before to during COVID-19?

SAMPLE

- A multinational industrial manufacturing company in China
- 3 departments
- 185 employees
- 34 offices in 16 cities
- 18 teams within and across cities

DATA

- October 2019 - March 2020
- Digital trace logs on a video conferencing platform
- Survey data (late Dec. 2019)
  - E.g., Who do you go to for advice or help, who do you rely on leadership
- HR data
  - E.g., Job title, position, formal leadership role

All three types of data above were linked via de-identified unique IDs for participants

TIMELINE

Major Events:

1/11/20 - Awareness of COVID

First COVID-related death reported in Chinese media

2/4/20 - Employees leave offices

Employees left for holiday (Chinese New Year), but did not return to office locations afterwards due to rapid progression of COVID-19

2/17/20 - Return to offices

Company begins a phased return of employees to working in offices

TIMELINE

Major Events:

1/11/20 - Awareness of COVID

2/4/20 - Employees leave Offices

2/17/20 - Phased Return to Offices

Normal Working (*10/8 - 1/10*)
We didn't realize we were in the "before" condition of a case study

Crisis Looming (*1/11 - 2/3*)
Public is aware of spreading virus, and consider how it may affect them.

Shift to Remote (*2/4 - 2/16*)
Public is aware of spreading virus, and consider how it may affect them.

Phased Return (*2/17 - 3/12*)
As pandemic is contained (in China), company begins partial return to offices

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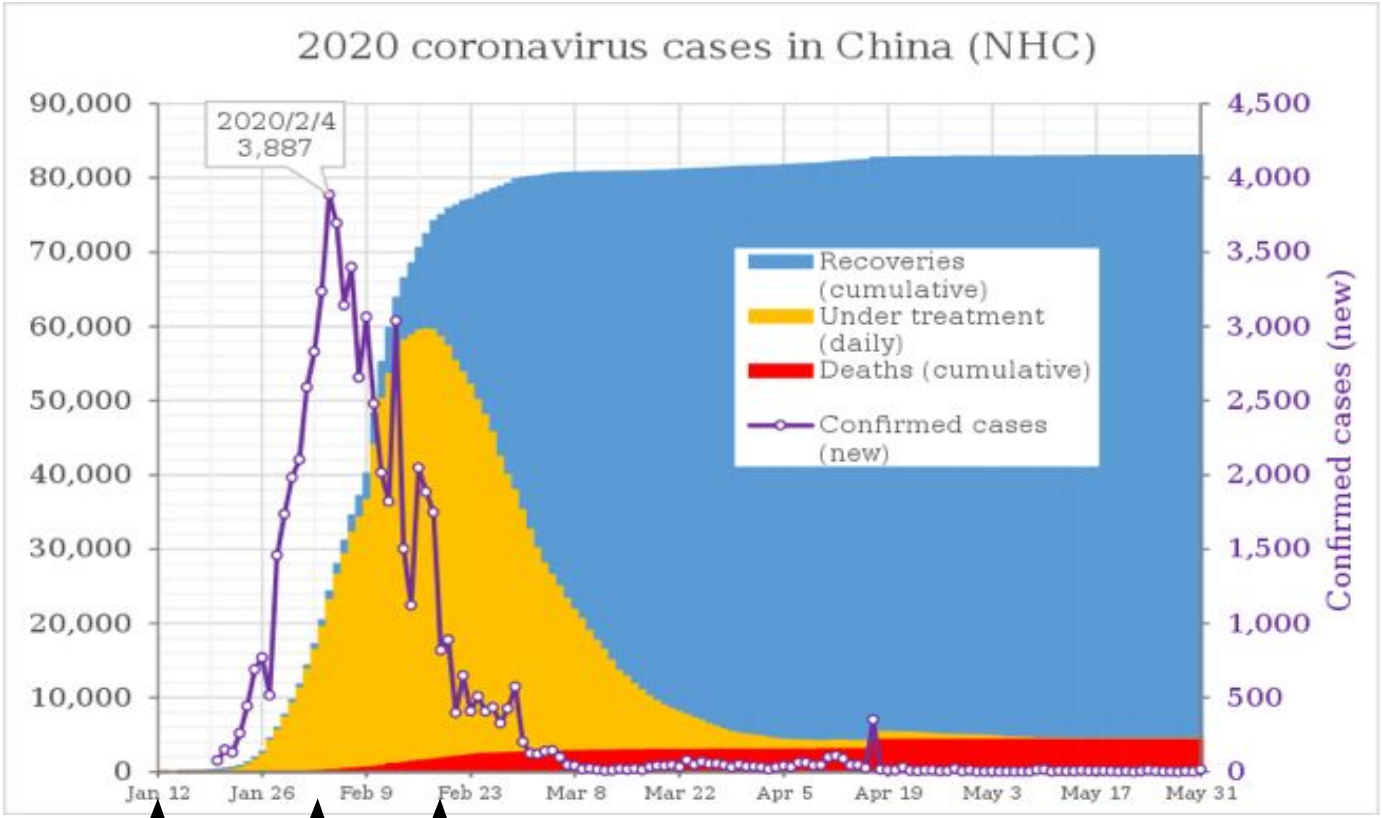
As pandemic is contained (in China), company begins partial return to offices

"The Normal"

"The New Normal"

"The Next Normal"

TIMELINE



Source: Data from National Health Commission
https://upload.wikimedia.org/wikipedia/commons/e/e5/2020_coronavirus_patients_in_China.svg

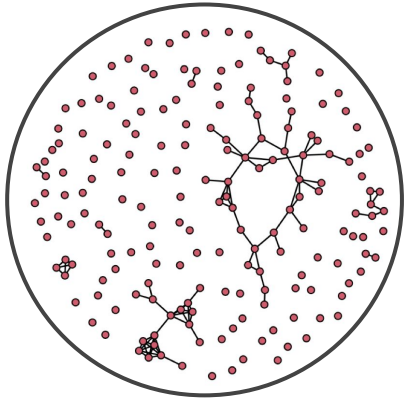
COMMUNICATION NETWORKS

For every workday, we create a communication network to describe “who meets with whom” from 185 employees in the company

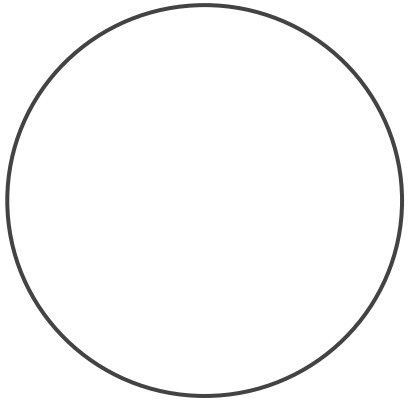
Nodes: Employees

Ties: Indicate employees who were in **at least one meeting together** that day. We exclude large company meetings, of size greater than 7 (Miller, 1956). In practice, 92.97% of meetings had 7 or fewer participants

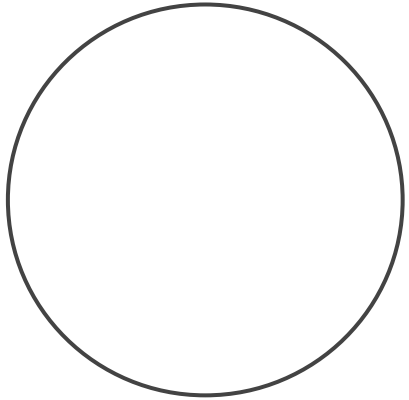
COMMUNICATION NETWORKS



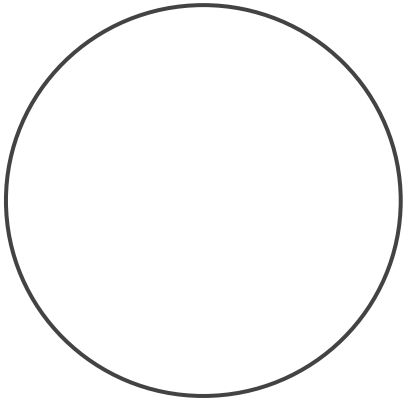
Normal Working
(10/8-1/10)



Crisis Looming
(1/11-2/3)

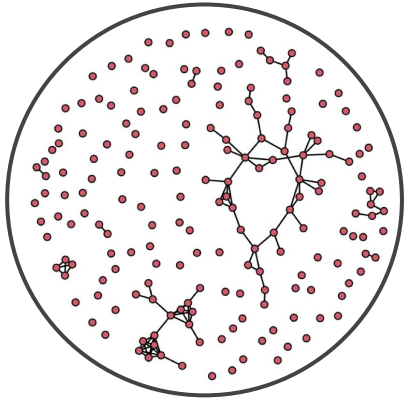


Shift to Remote
(2/4-2/16)



Phased Return
(2/17-3/12)

COMMUNICATION NETWORKS



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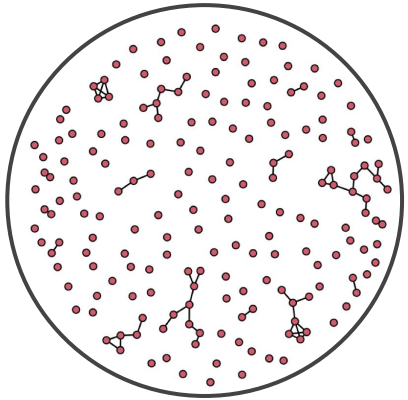
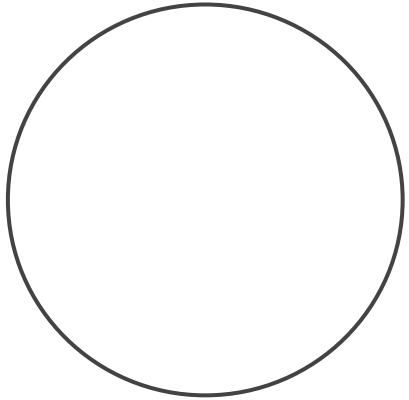


Crisis Looming
(1/11-2/3)



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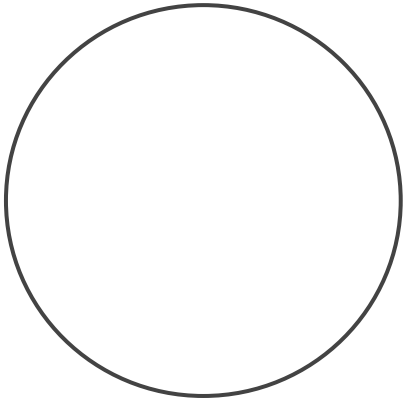
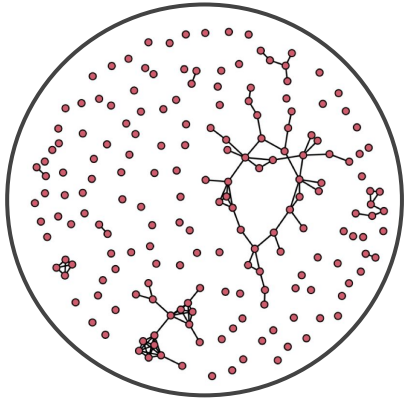
(2/4-2/16)



Phased Return
(2/17-3/12)

COMMUNICATION NETWORKS



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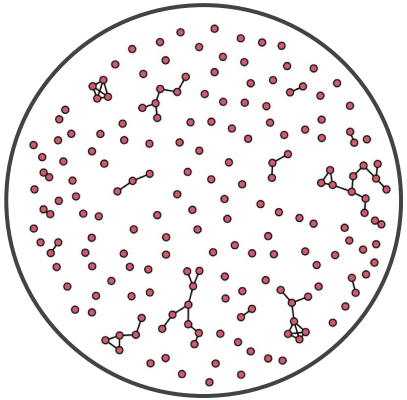
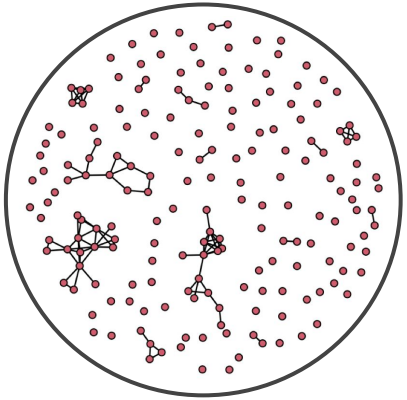
(10/8-1/10)



Crisis Looming
(1/11-2/3)



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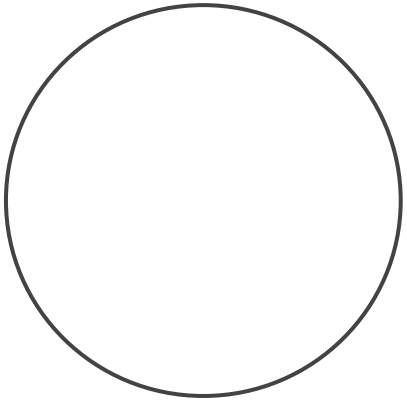
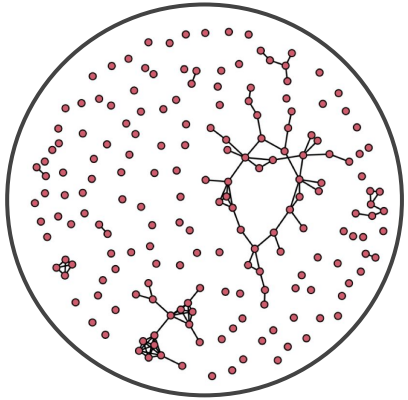
(2/4-2/16)



Phased Return
(2/17-3/12)

COMMUNICATION NETWORKS



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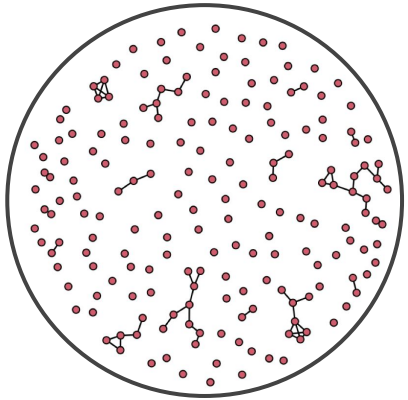

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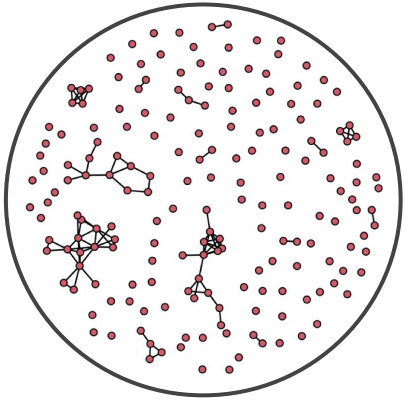

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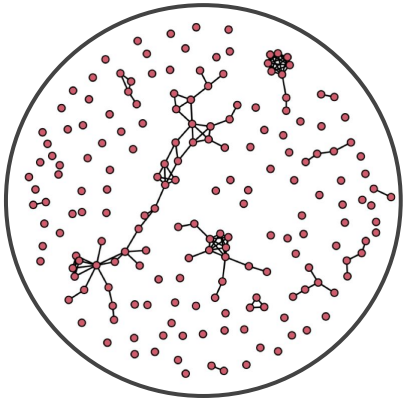
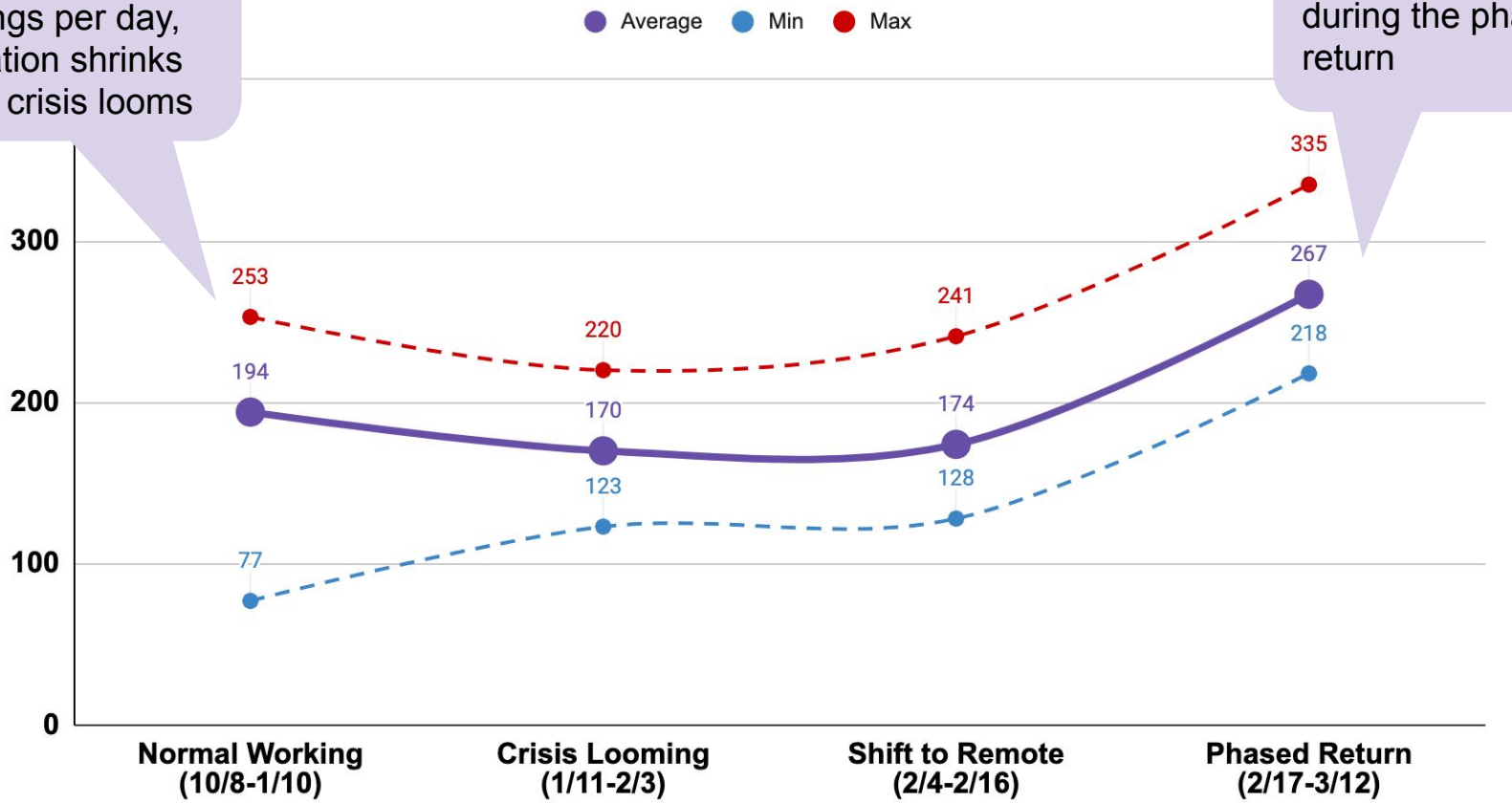
(2/4-2/16)



Phased Return
(2/17-3/12)

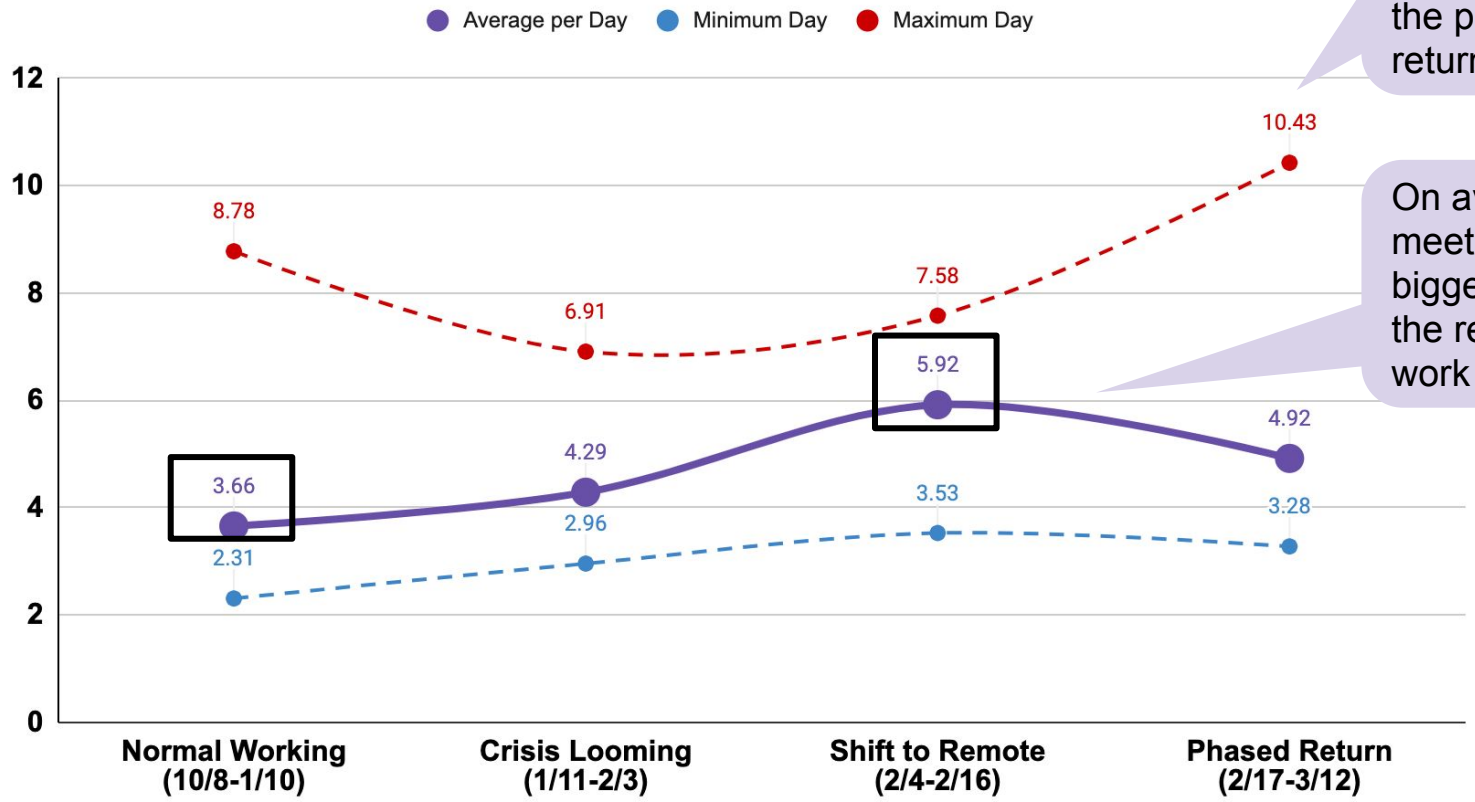
Pre-COVID we see high variation in the # of meetings per day, this variation shrinks once the crisis looms

Daily Meetings (# of Meetings)



Meetings increase dramatically (53%) during the phased return

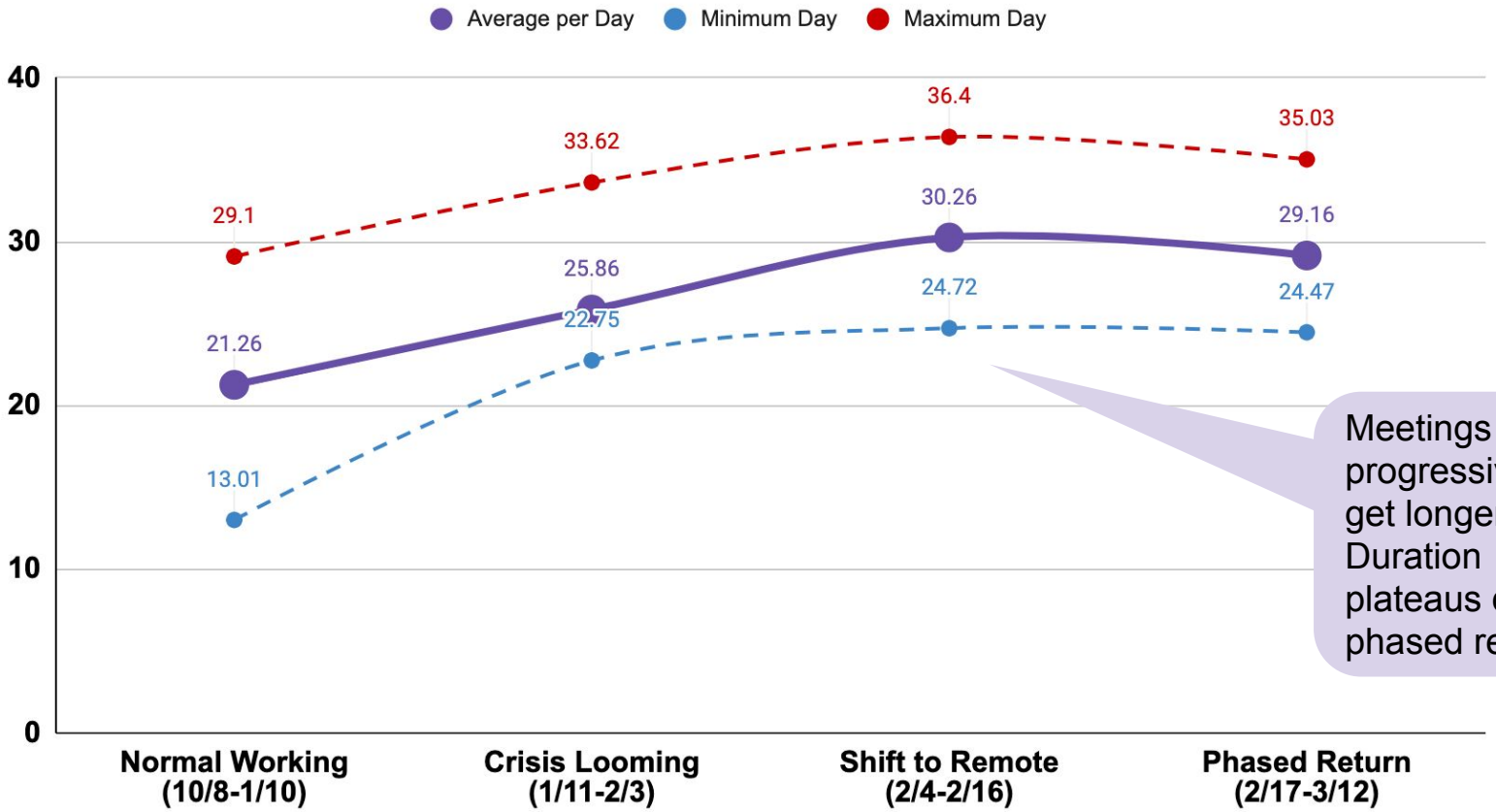
Size of Meetings (# of People)



The maximum meeting size highest during the phased return

On average, meetings get bigger during the remote work period

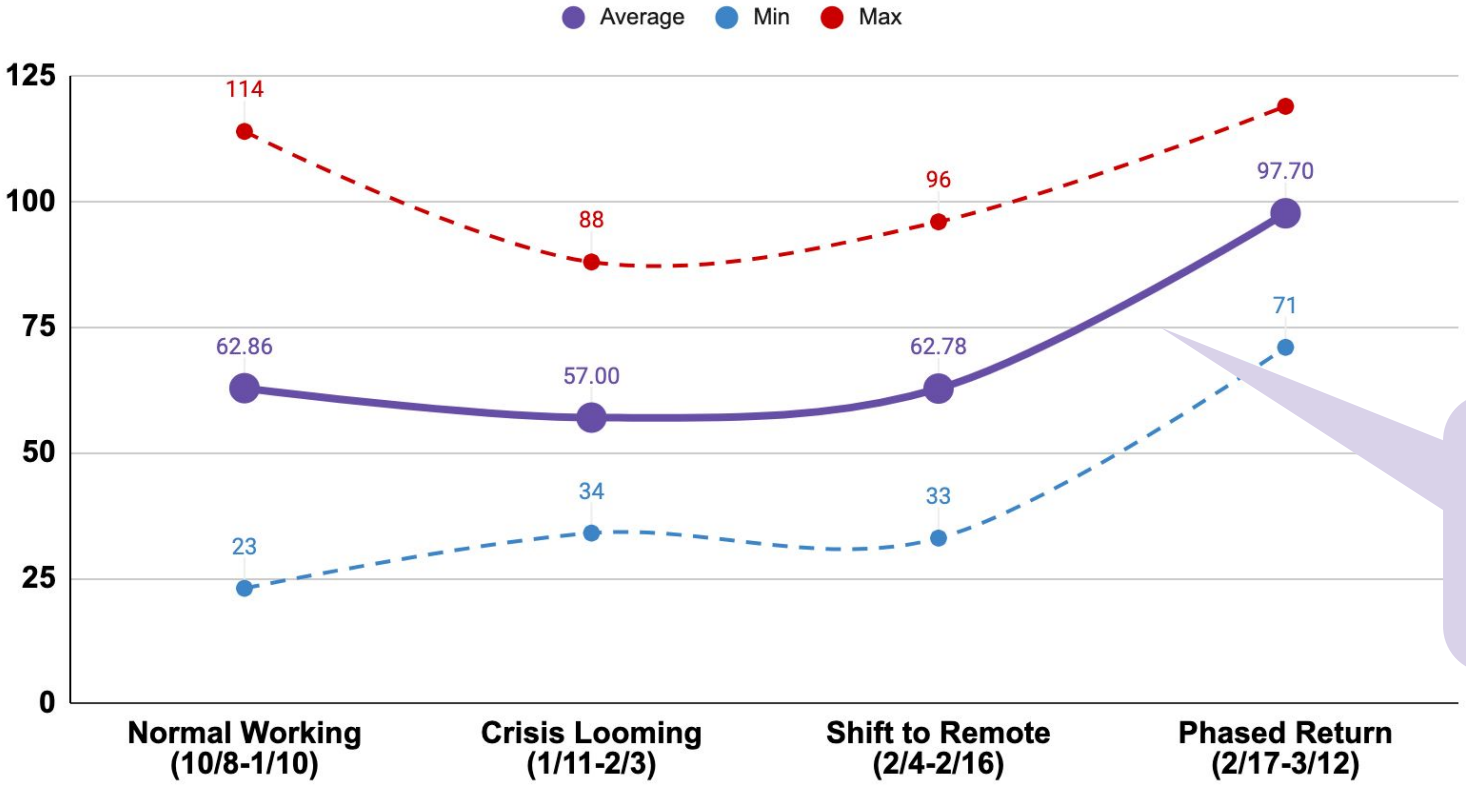
Duration of Meetings (# of Minutes)



Meetings progressively get longer. Duration plateaus during phased return.

What patterns of connection within and between teams do we observe over time?

of Ties (Dyads connected through meetings < 8)



Increases in # of contacts during shift to remote & phased return

The Old Normal (Pre-COVID-19)

63 dyads/day teaming up

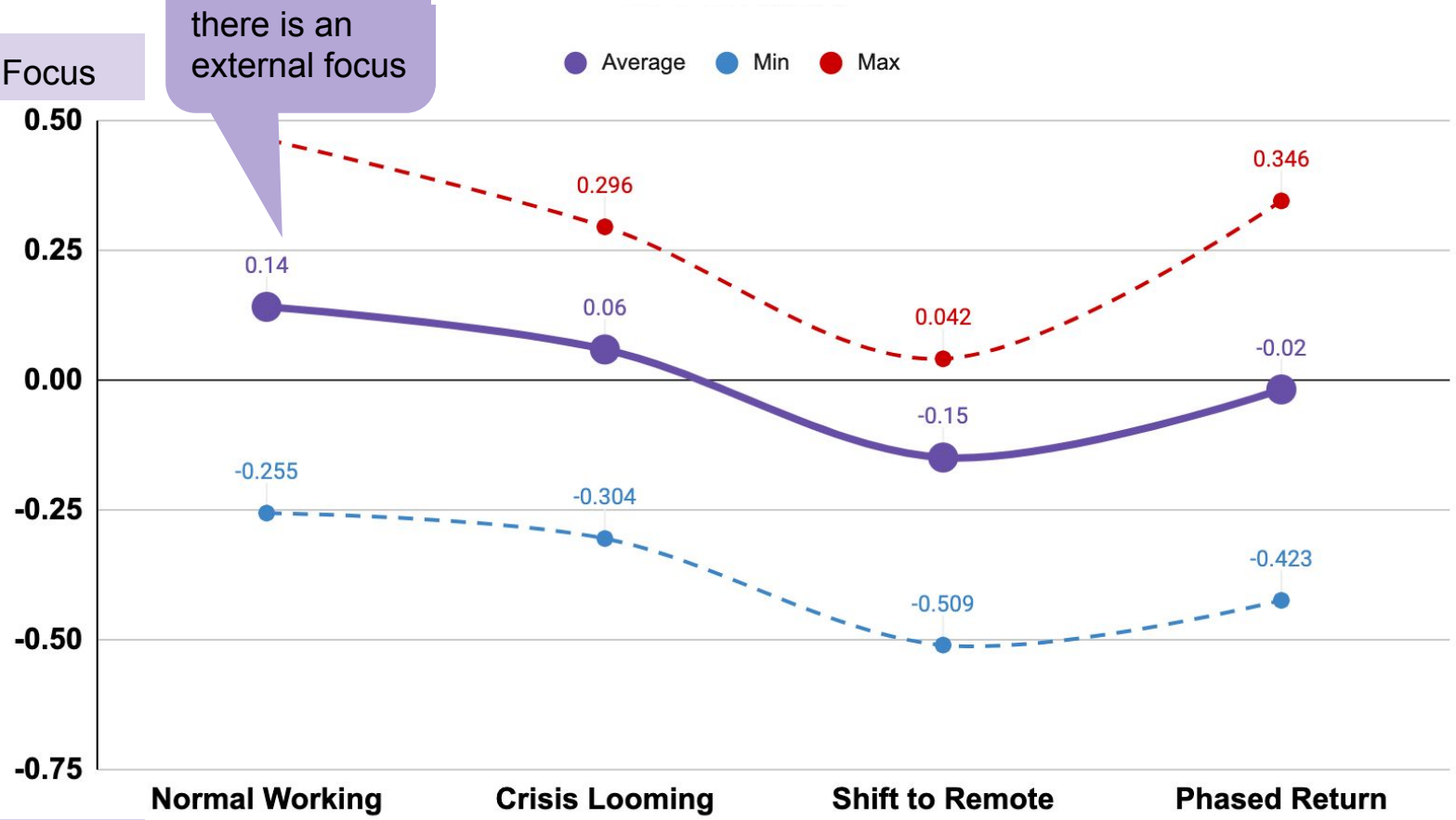
The NEXT Normal (Phased Return)

98 dyads/day teaming up

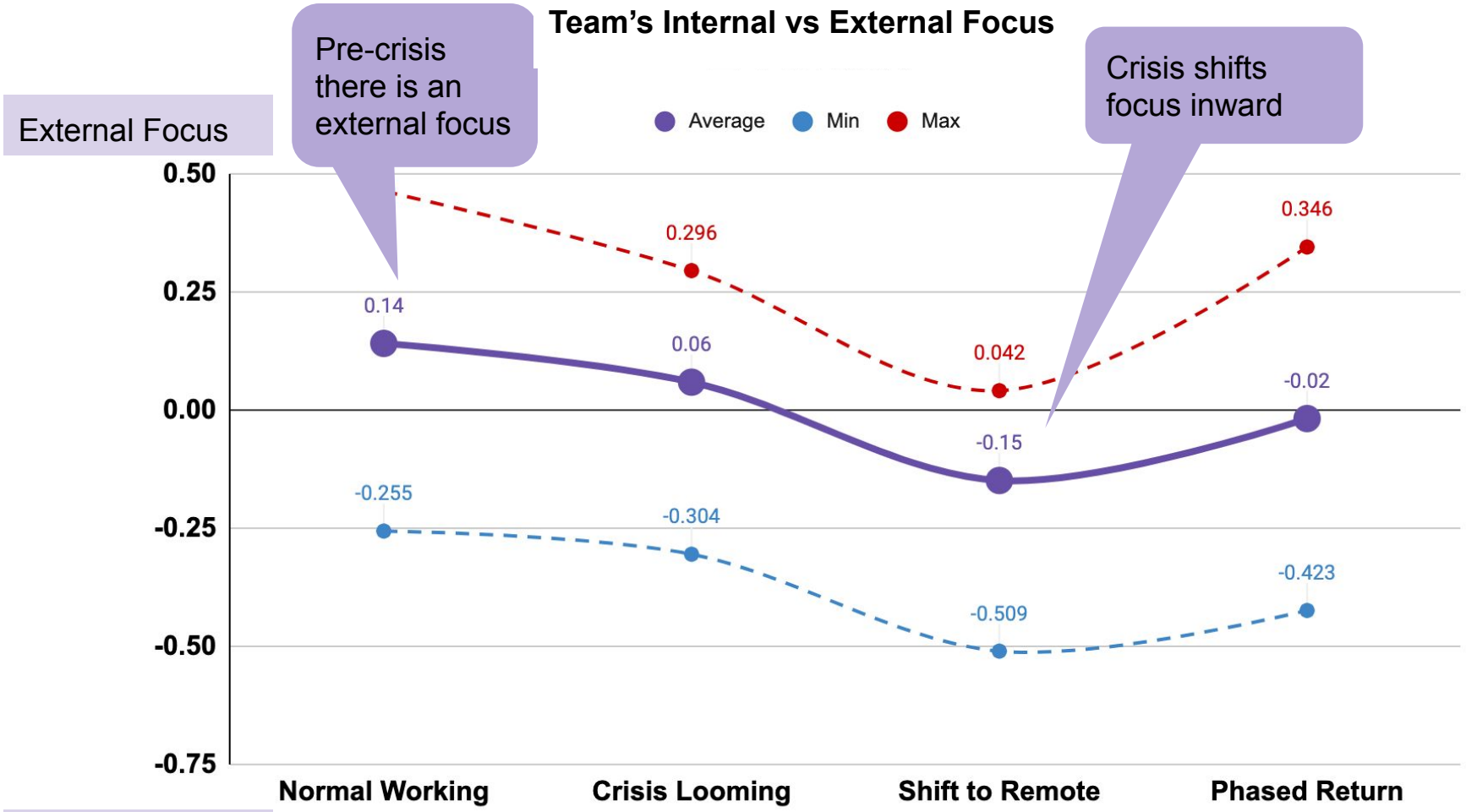
Team's Internal vs External Focus

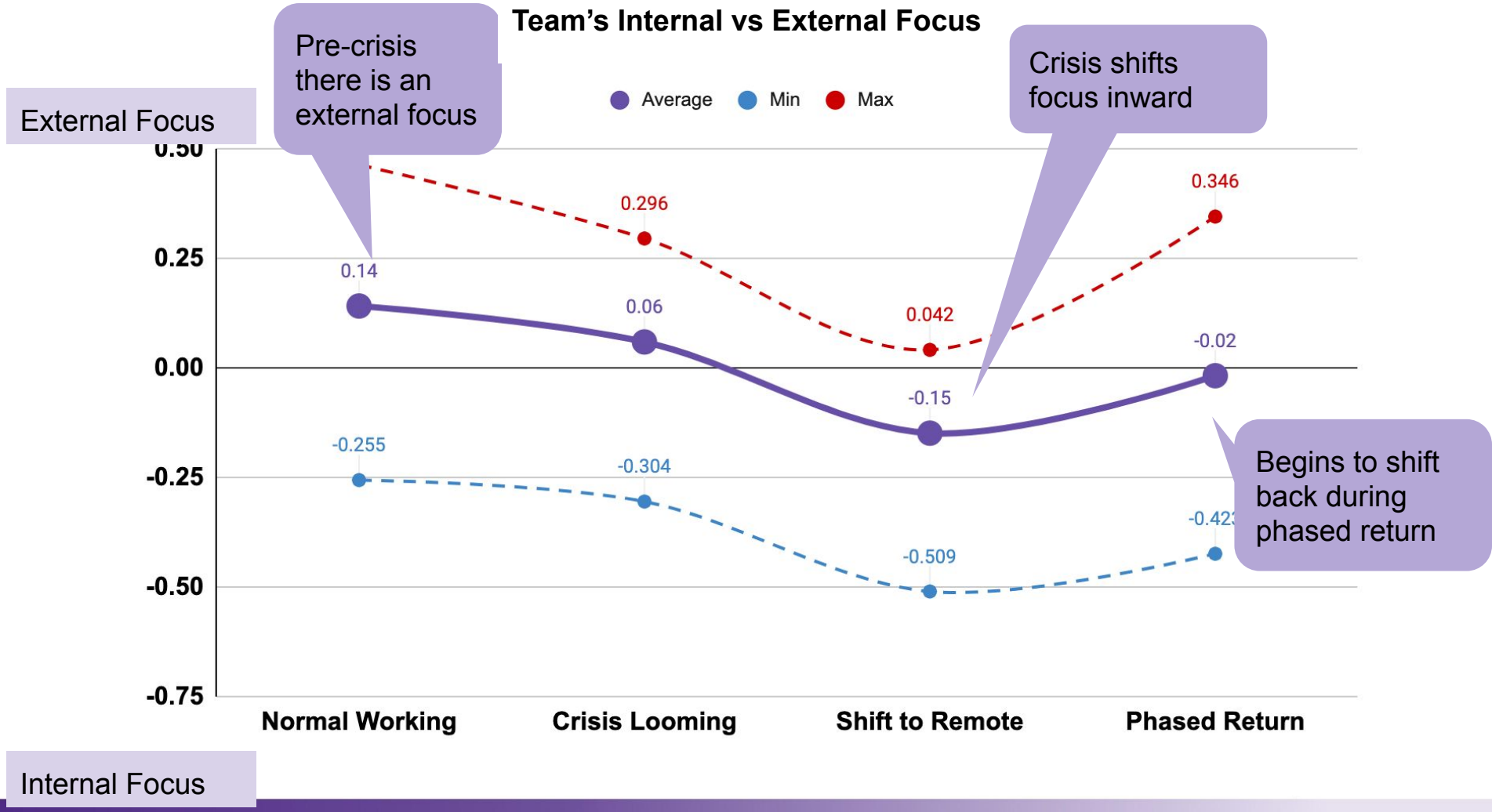
Pre-crisis there is an external focus

External Focus

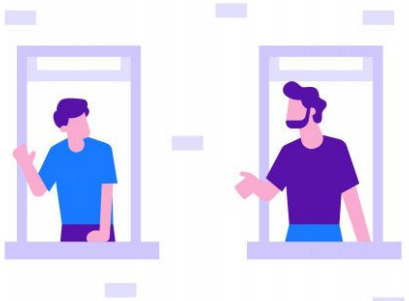


Internal Focus


Team's Internal vs External Focus
Pre-crisis there is an external focus
Crisis shifts focus inward
External Focus
Internal Focus
Average
Min
Max
0.50
0.25
0.00
-0.25
-0.50
-0.75
0.14
0.06
-0.15
-0.02
0.296
0.042
0.346
-0.255
-0.304
-0.509
-0.423
Normal Working
Crisis Looming
Shift to Remote
Phased Return


Team's Internal vs External Focus
Pre-crisis there is an external focus
Crisis shifts focus inward
Begins to shift back during phased return
External Focus
Internal Focus
Average
Min
Max
0.50
0.25
0.00
-0.25
-0.50
-0.75
0.14
0.06
-0.15
-0.02
0.296
0.042
0.346
-0.255
-0.304
-0.509
-0.423
Normal Working
Crisis Looming
Shift to Remote
Phased Return

The Old Normal (Pre-COVID-19)



External focus

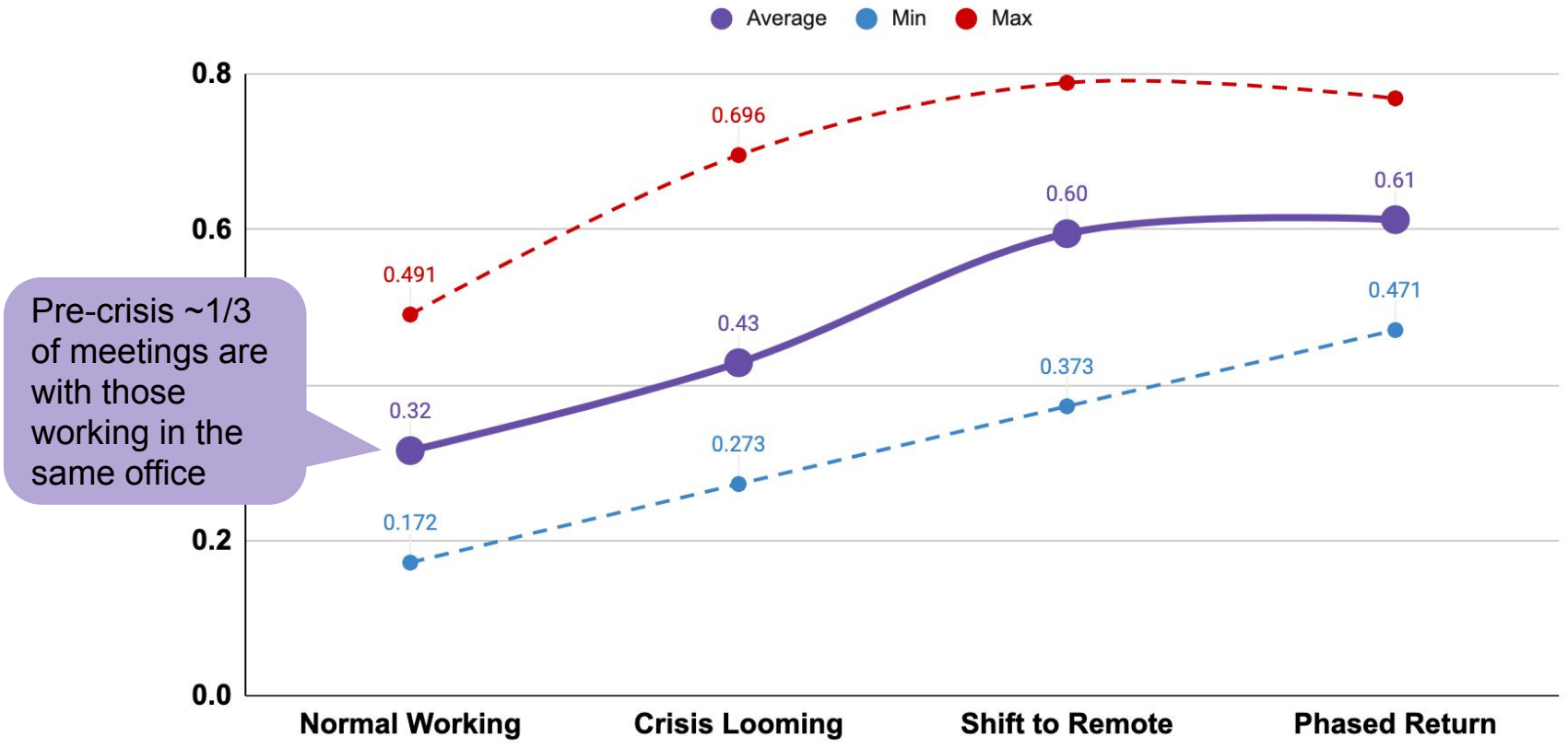
The New Normal (Remote Work)

Internal focus

The NEXT Normal (Phased Return)

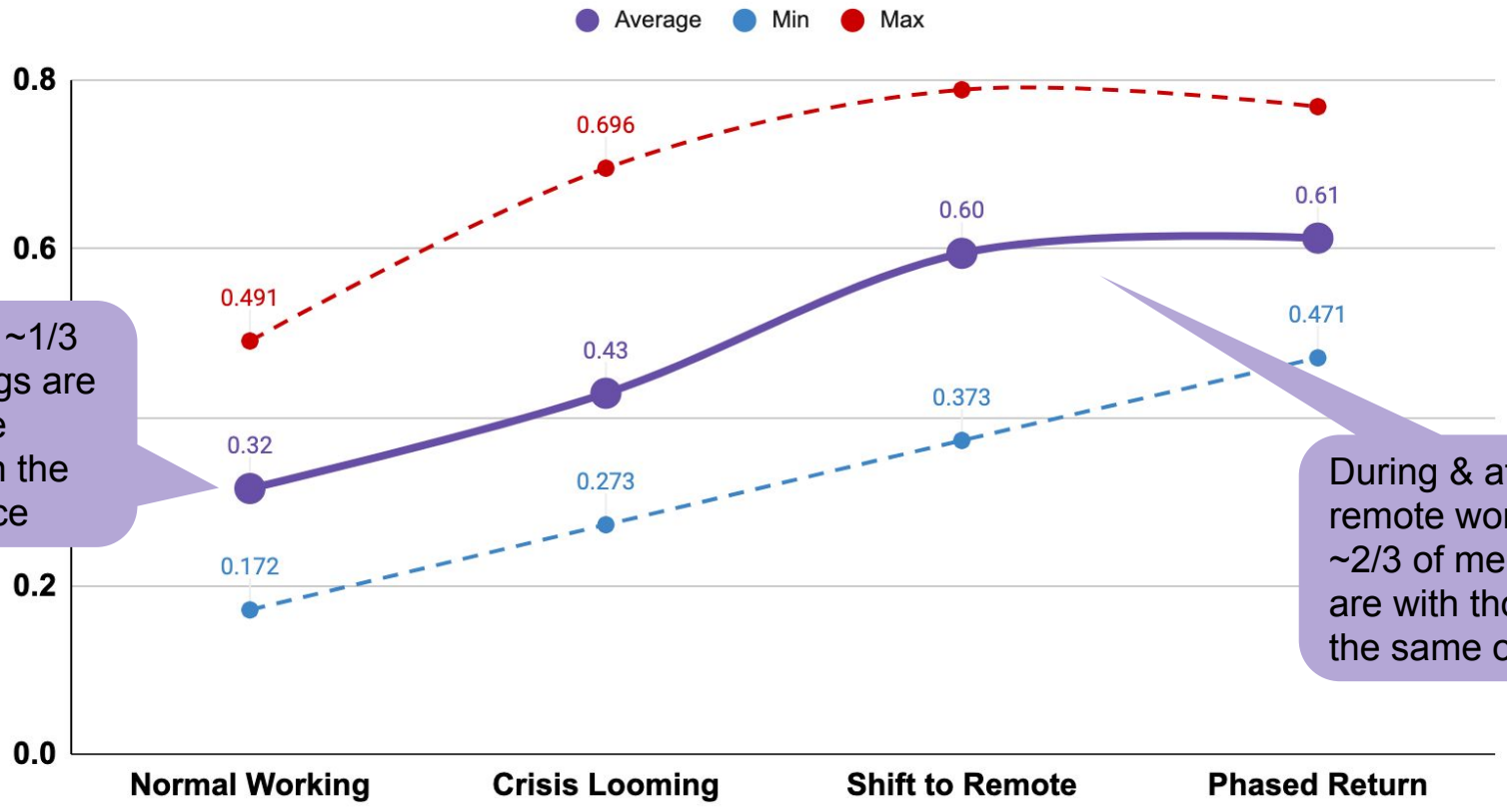
External-Internal balanced

% of ties within the same office



Pre-crisis ~1/3 of meetings are with those working in the same office

% of ties within the same office



Pre-crisis ~1/3 of meetings are with those working in the same office

During & after remote work ~2/3 of meetings are with those in the same office

The Old Normal (Pre-COVID-19)

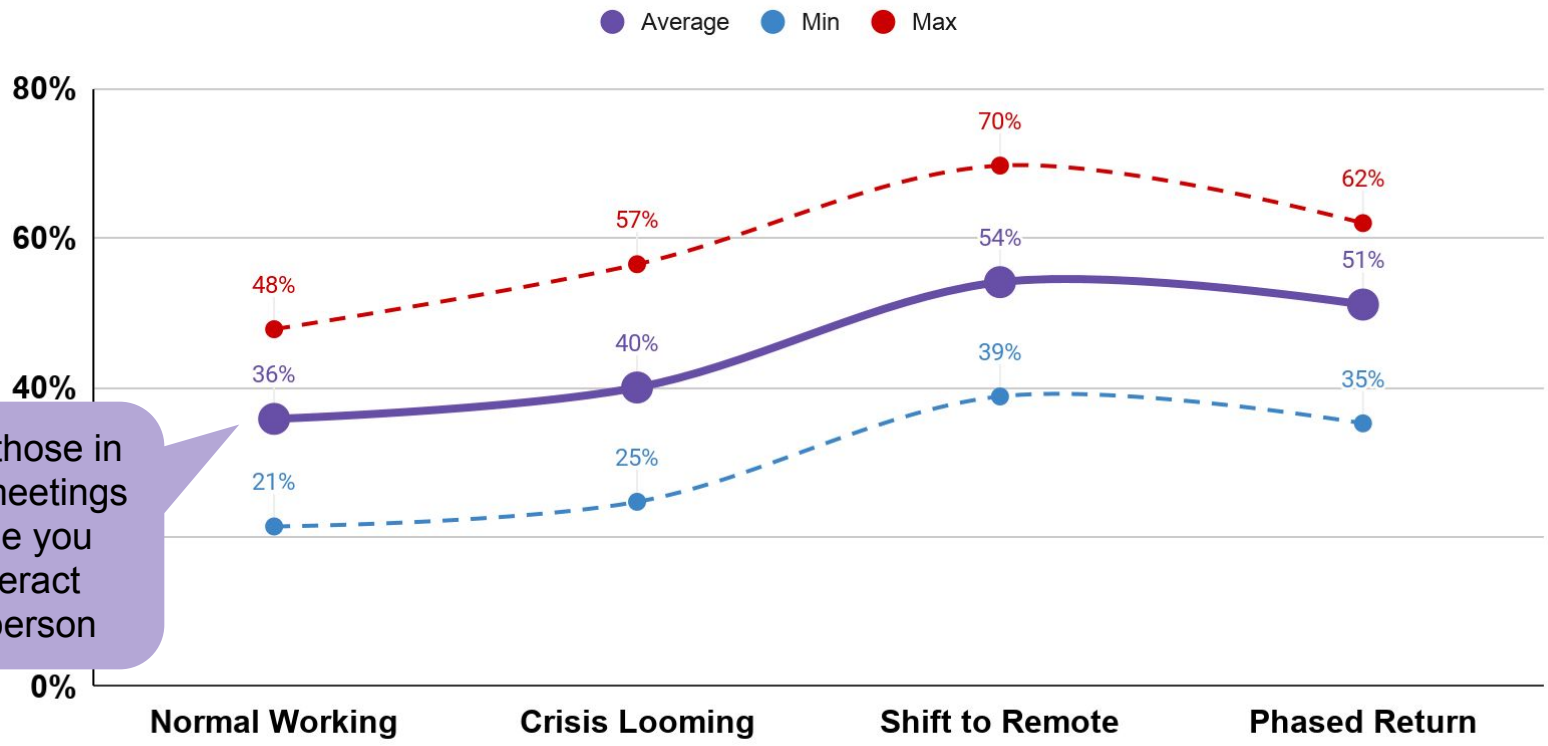
The New & Next Normal (Remote Work/Phased Return)

~2/3 of virtual teaming is among those who work in different places

~2/3 of virtual teaming is among those working in the same office

Do team networks broaden or deepen over time?

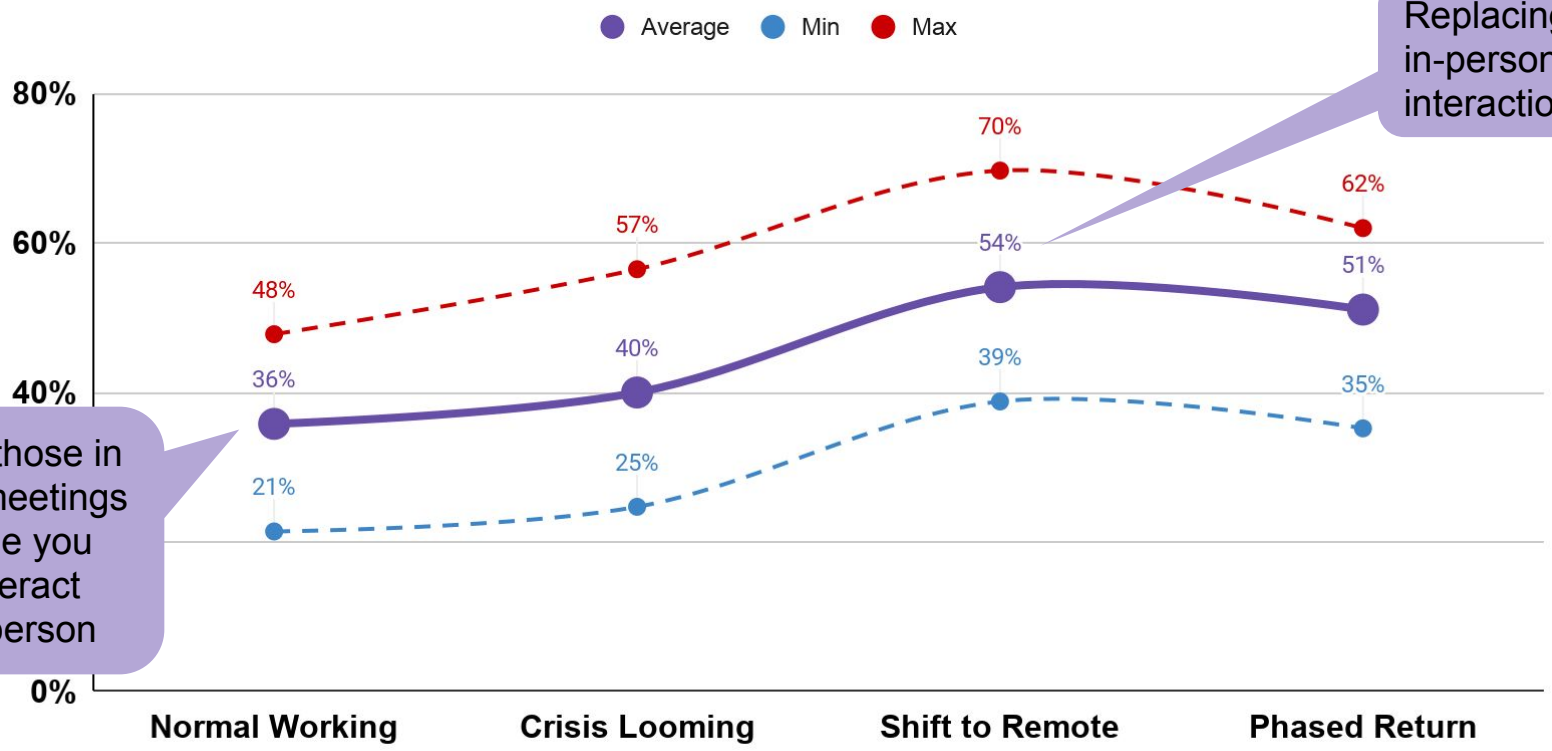
% of Ties aligning with contacts with whom they had pre-Covid in-person interaction (survey)



~2/3 of those in online meetings are those you don't interact with in person

"In the past month, who have you interacted with in-person?" Collected pre-COVID, 12/11 - 1/10.

% of Ties aligning with contacts with whom they had pre-Covid in-person interaction (survey)

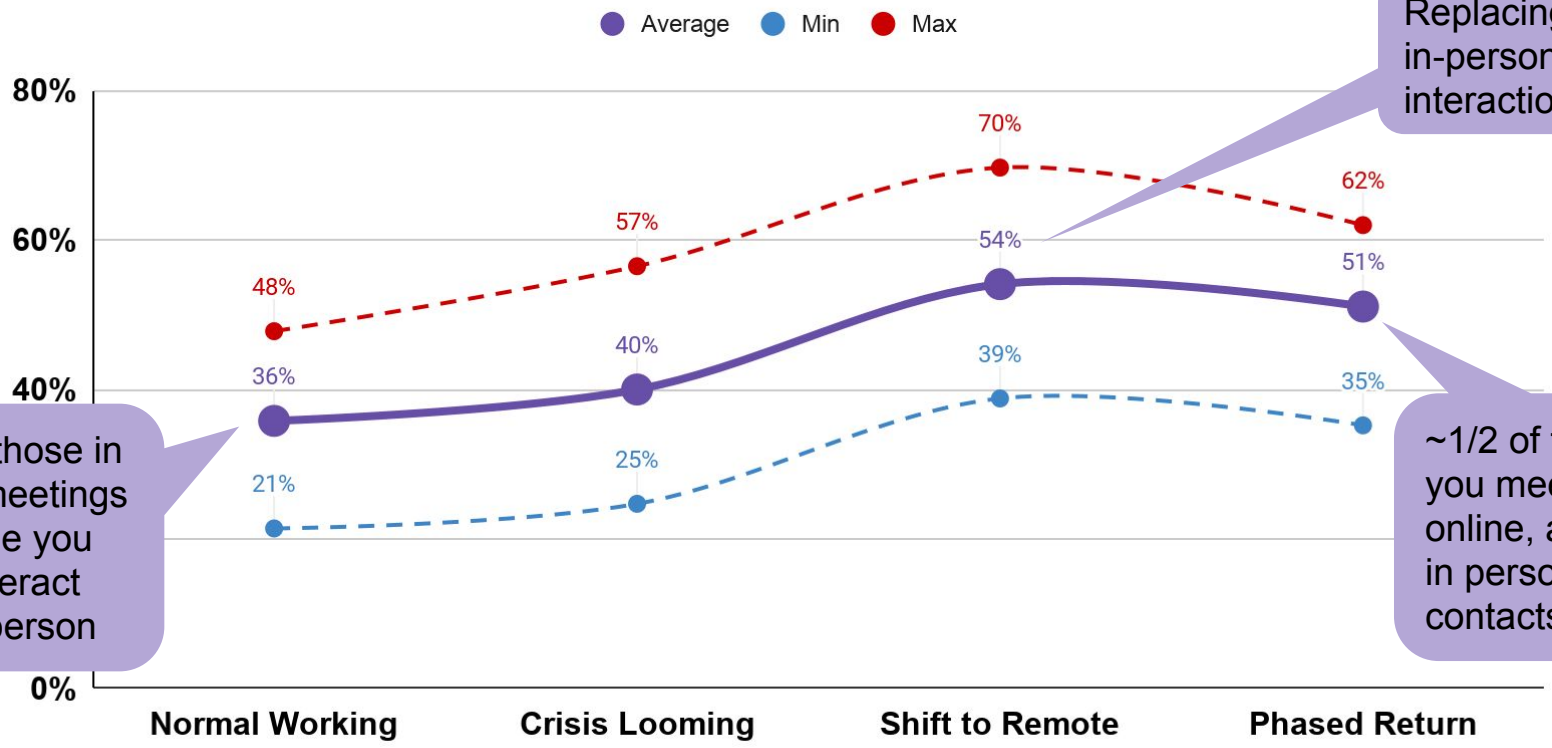


Replacing in-person interaction

~2/3 of those in online meetings are those you don't interact with in person

"In the past month, who have you interacted with in-person?" Collected pre-COVID, 12/11 - 1/10.

% of Ties aligning with contacts with whom they had pre-Covid in-person interaction (survey)



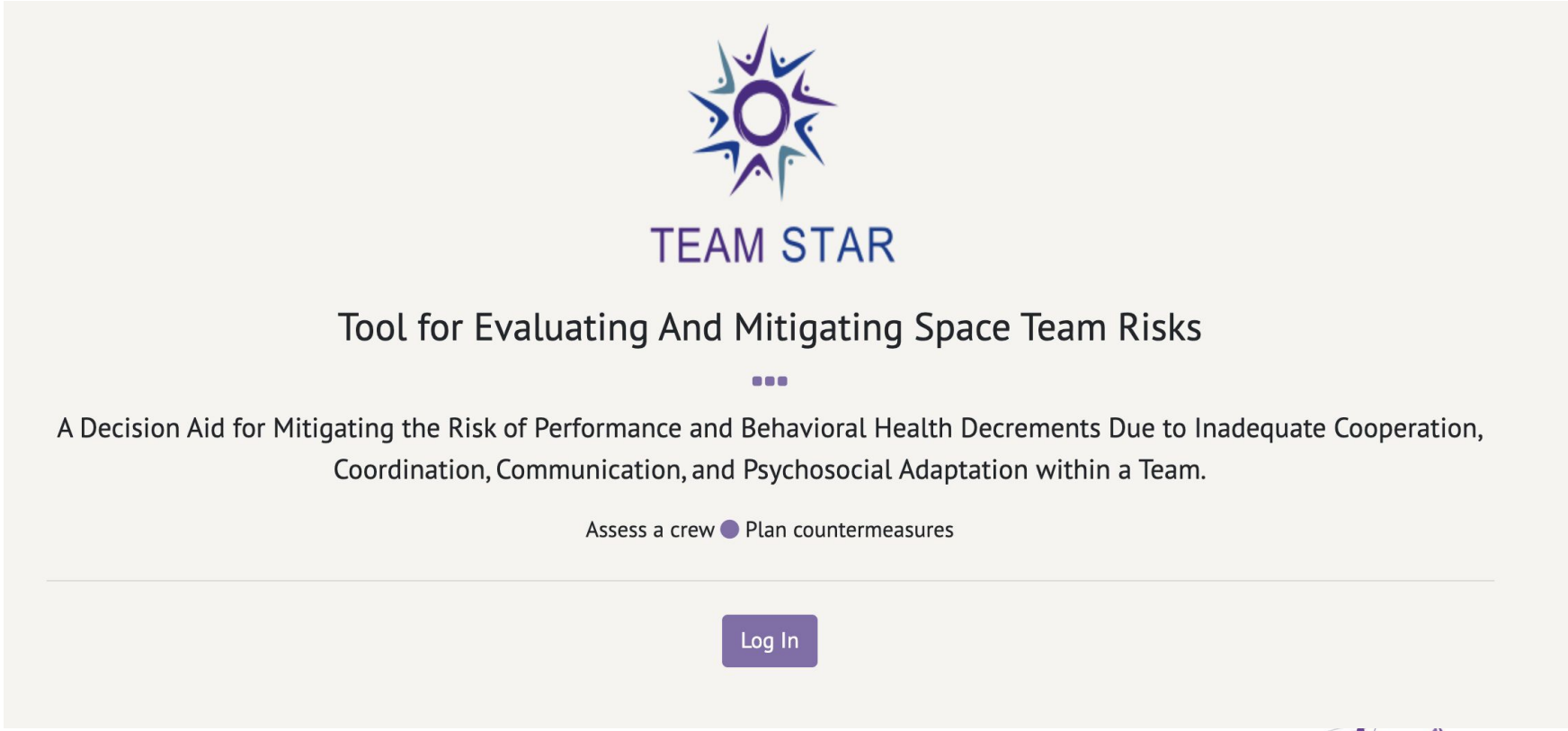
Replacing in-person interaction

~2/3 of those in online meetings are those you don't interact with in person

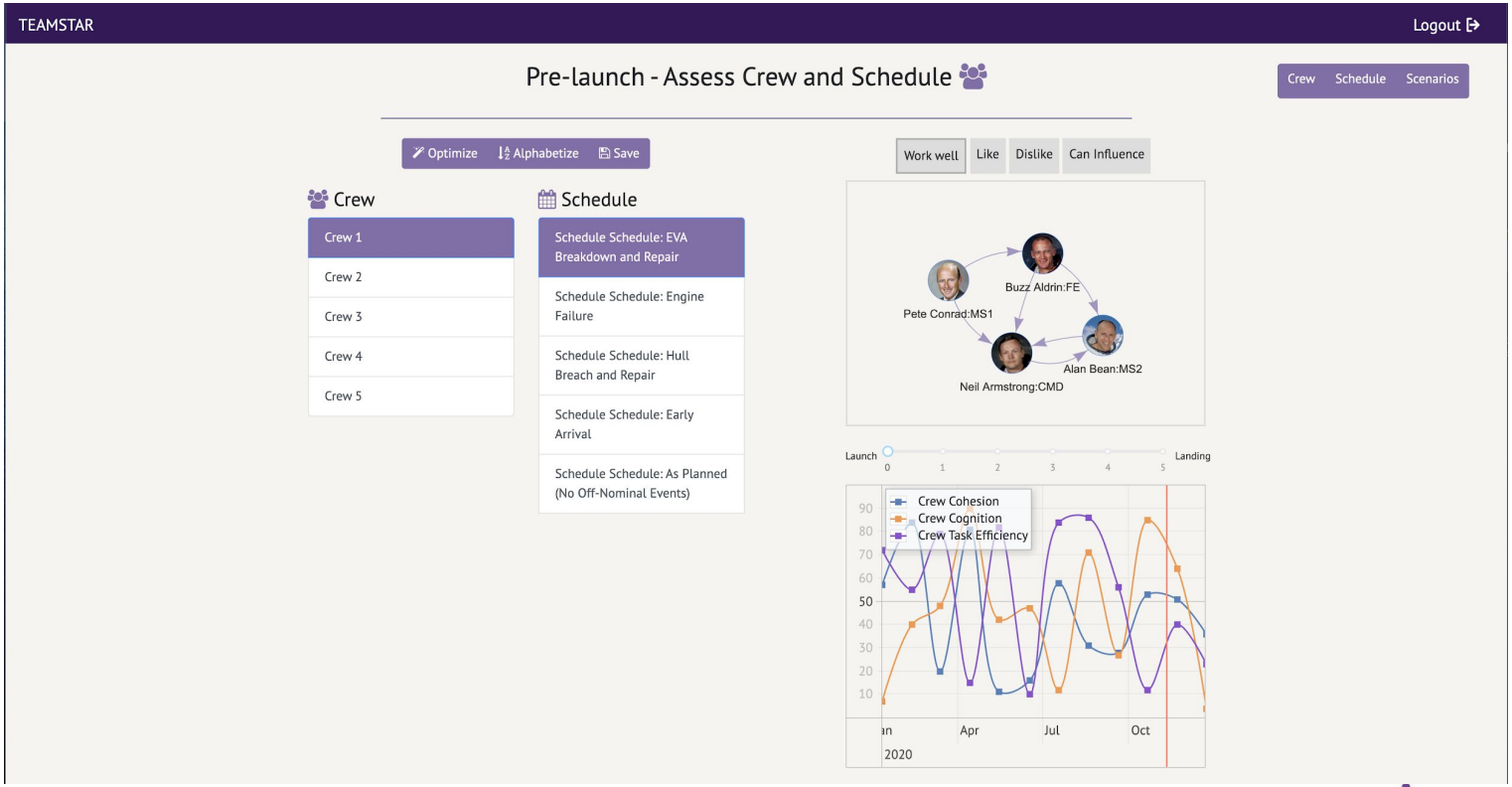
~1/2 of those you meet with online, are also in person contacts

"In the past month, who have you interacted with in-person?" Collected pre-COVID, 12/11 - 1/10.

People Analytics to help NASA Select Crews for Missions to Moon and Mars



People Analytics to help NASA Select Crews for Missions to Moon and Mars



Northwestern University

http://nasa.soc.northwestern.edu/

SONIC ATLAS ADVANCING TEAMS, LEADERS, & SYSTEMS

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SONIC ATLAS