Using D-Wave to

Advise Pandemic Policy

Problem

1918 Pandemic
US Deaths: 675,000

1957 Pandemic
US Deaths: 100,000

1968 Pandemic
US Deaths: 100,000

2009 Pandemic
US Deaths: 12,500

2020 COVID-19
US Deaths: 145,000 +

Current Approaches

Strategy 1: Stayed Open

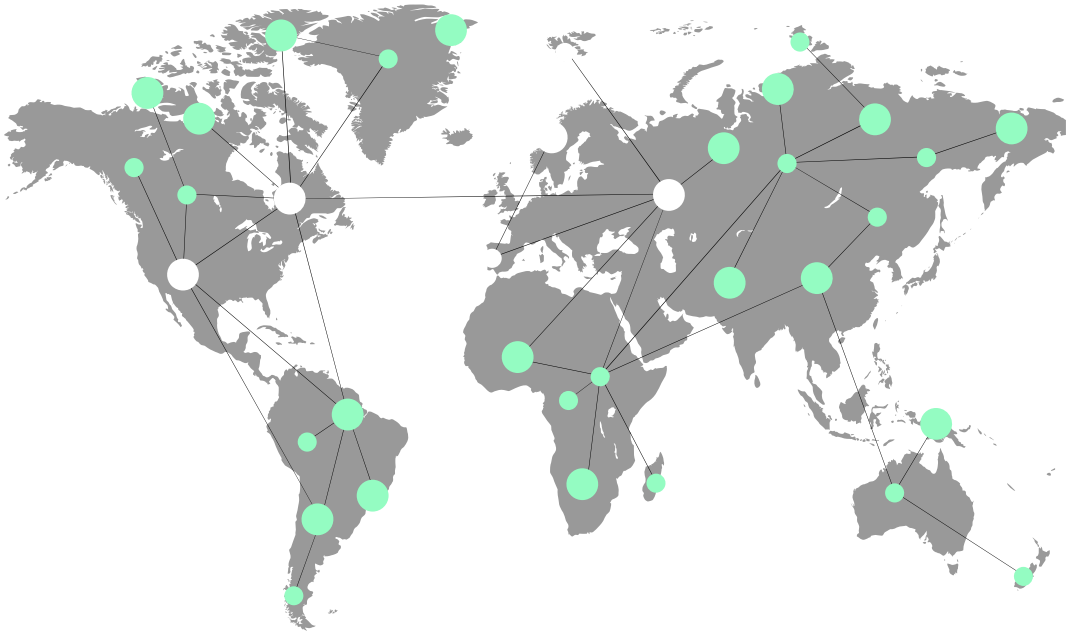
- GDP (Y/Y): **0%**
- Deaths (Y/Y): **+27%**

Strategy 2: Closed Down

- GDP (Y/Y): **-6%**
- Deaths (Y/Y): **+6%**

There's a better way…

Our Approach



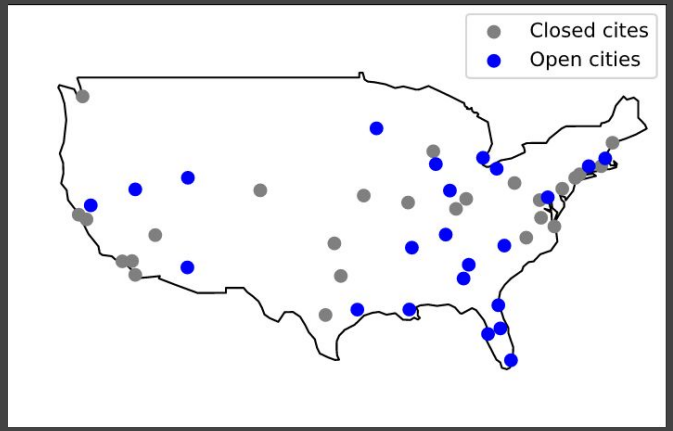
Knapsack Problem

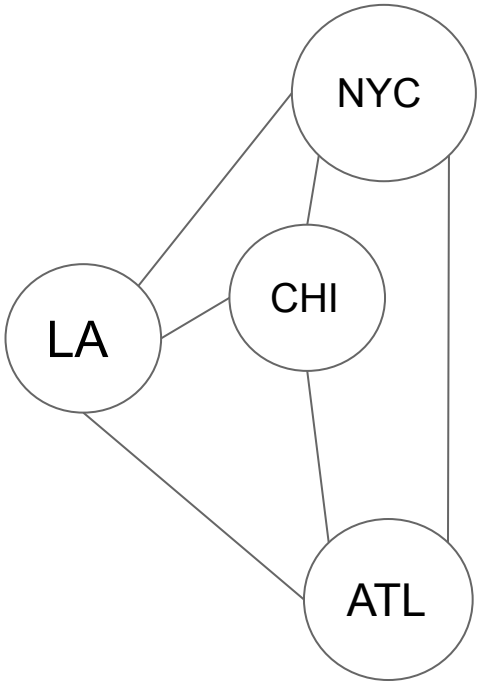
$$\mathcal{W} = \sum_{\alpha=1}^{N} w_\alpha x_\alpha$$

$$H_A = A\left(1 - \sum_{n=1}^{W} y_n\right)^2 + A\left(\sum_{n=1}^{W} n y_n - \sum_{\alpha} w_\alpha x_\alpha\right)^2$$

Example Solution

Optimal Policy Strategy
Number of closed cities: 23
Number of open cities: 26
Solution energy: -1988824.0
Anticipated GDP: 11786231.5 (90.2%)
Hospitalizations: 991959 (99.2% of capacity)



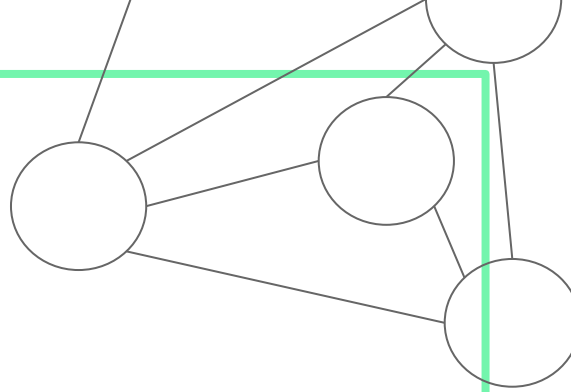


Goal: Maximize US GDP, minimize infection

City Factors:
- GDP
- infected population
- hospital capacity
- travel in/out

Solution:
- Cities to shut down and cities to keep open
- Anticipated GDP

Our Tech Advantage



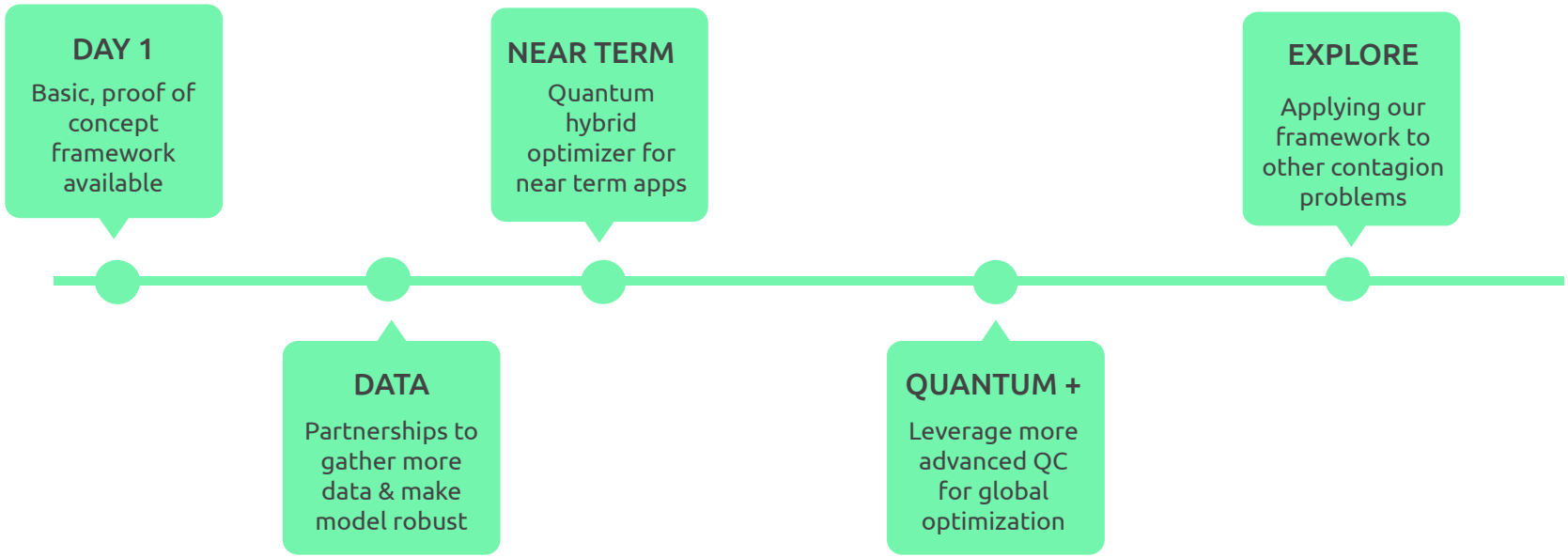
Solving an NP-hard problem, Knapsack Problem, with quantum computing devices to provide an exponential speedup in computing capabilities

50 cities:

2^{50} = 10,000,000,000,000,000 combinations to search through classically

We computed in 16 seconds using D-Wave

Our Timeline, planning ahead



Leveraging our TEAM

Q-Alpha

PHYSICS

Theoretical QC Research

TECHNICAL

Optimization Research

SOFTWARE

Machine Learning
coding

BUSINESS

Business Development
+ QC research

DATA

Quantitative Finance

Thank you!

Q-Alpha

CREATIVE
DESTRUCTION
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D:wave
The Quantum Computing Company™