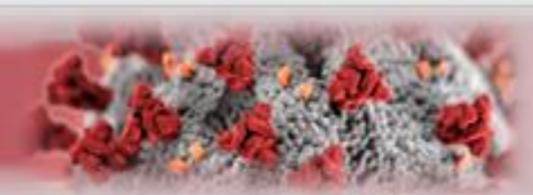




Rapid Acceleration of Diagnostics (RADx)

August 18, 2020

**RADx Tech COVID-19 Webinar Series:
As the coronavirus unfolds...**



Returning to Normal Activities: A Modeling Tool to Assist in Planning

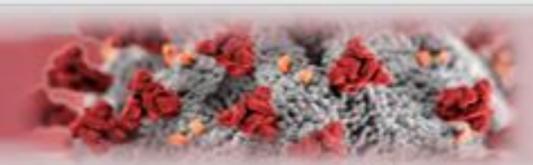
Today we will discuss a modeling tool that provides guidance on possible mitigation and testing approaches to reduce the spread of COVID-19 within an organization.

Anette 'Peko' Hosoi

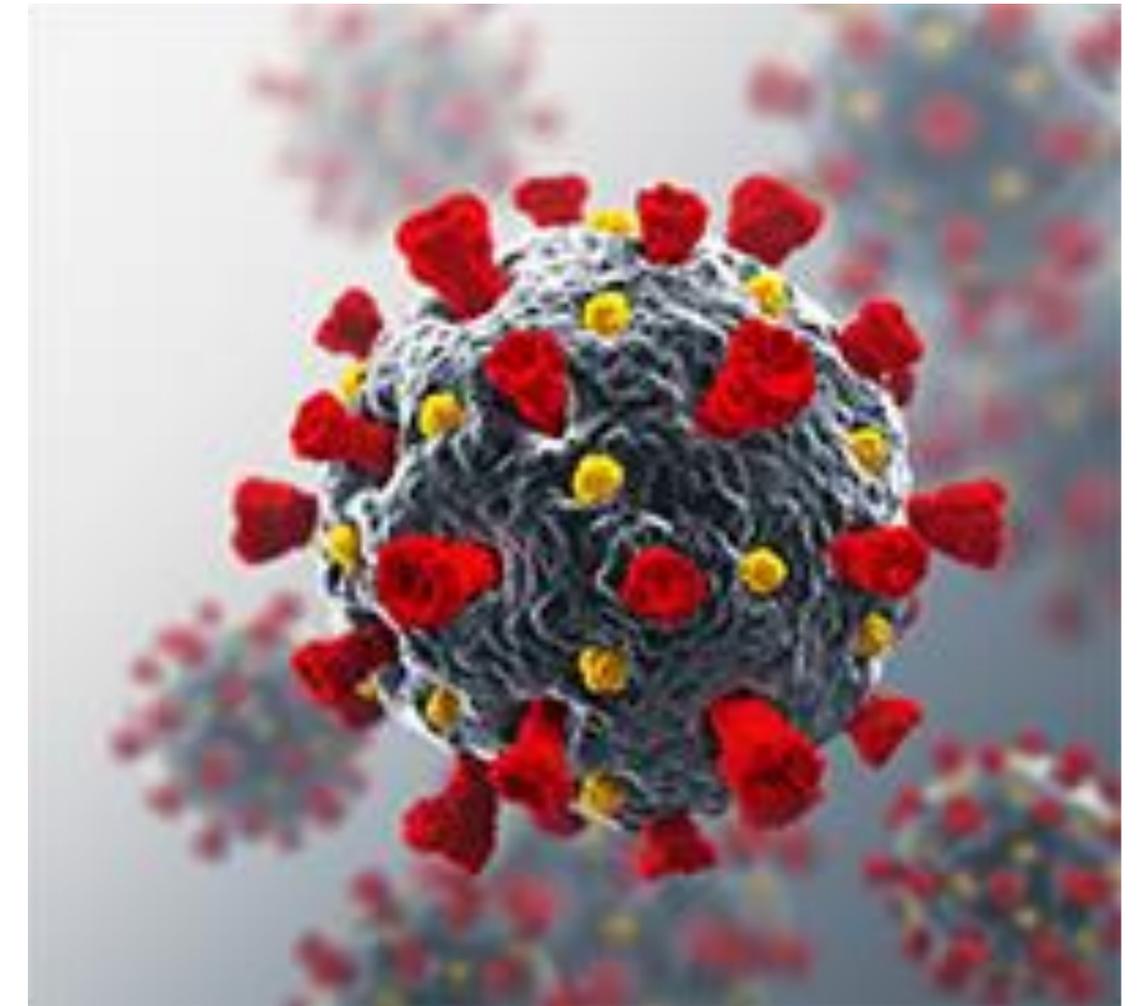
Associate Dean of Engineering MIT; Neil and Jane Pappalardo Professor, Mechanical Engineering

Paul Tessier

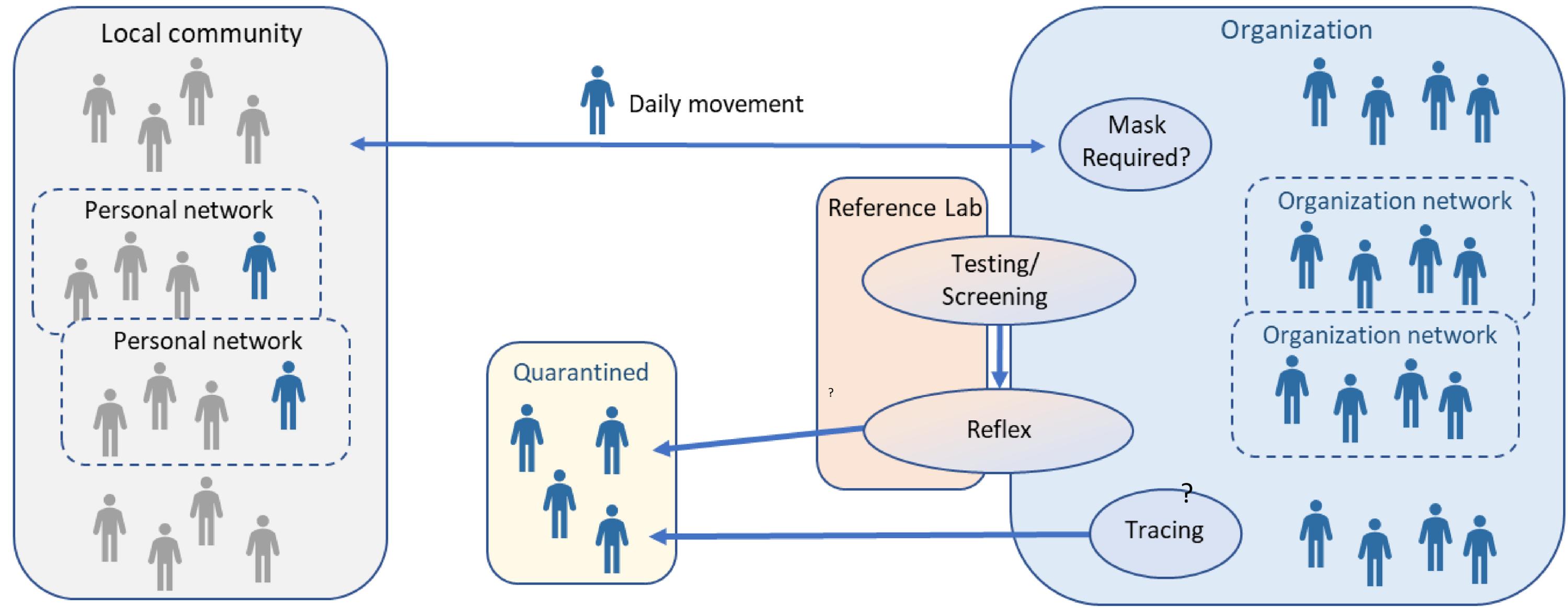
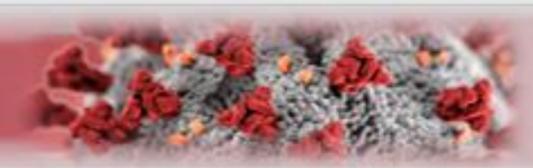
CIMIT Product Development Director, Consortia for Improving Medicine with Innovation & Technology



- Rapidly produce innovative SARS-CoV-2 diagnostic tests that will assist the public's safe return to normal activities
- Support the full range of product development including commercialization and product distribution/deployment
- Recognition that other mitigation strategies impact test deployment strategy
- Model focused on Semi-contained Communities (e.g. companies, schools)

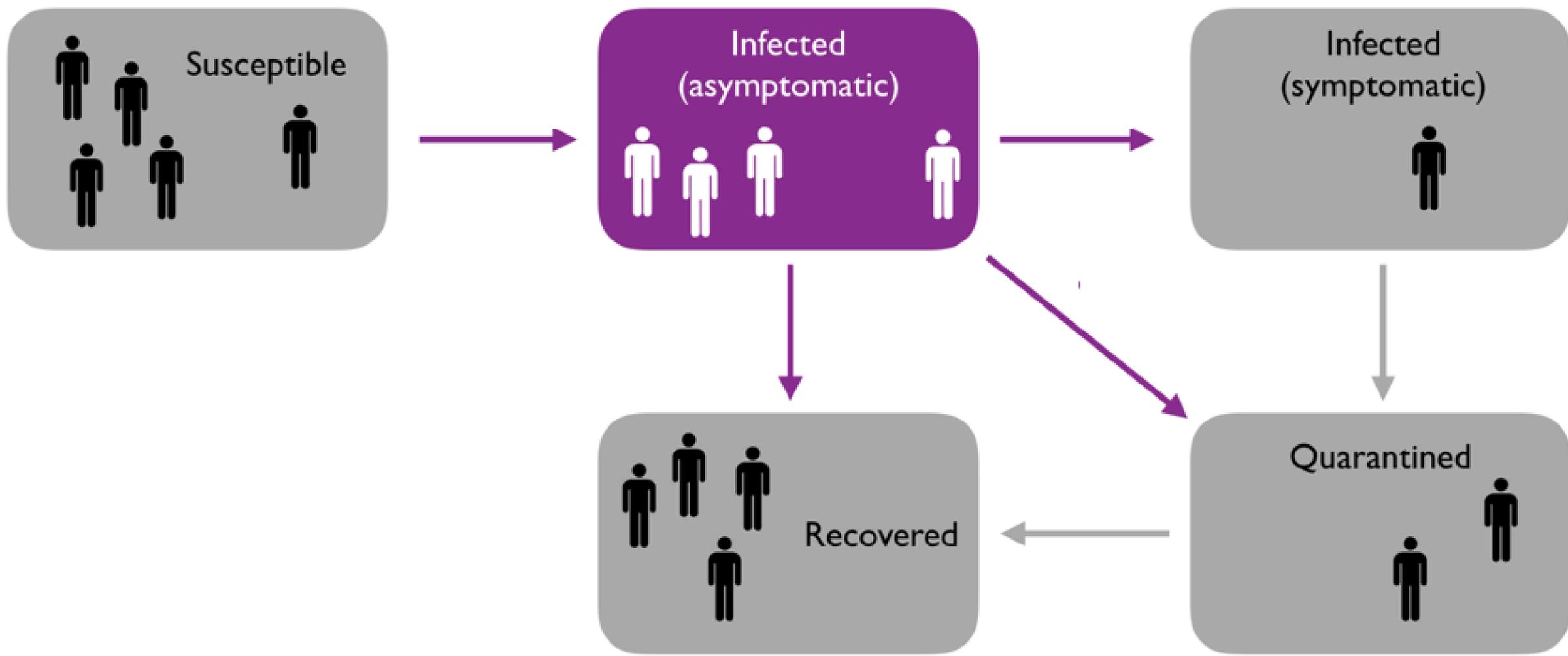


Semi-contained Communities (e.g. companies, schools)

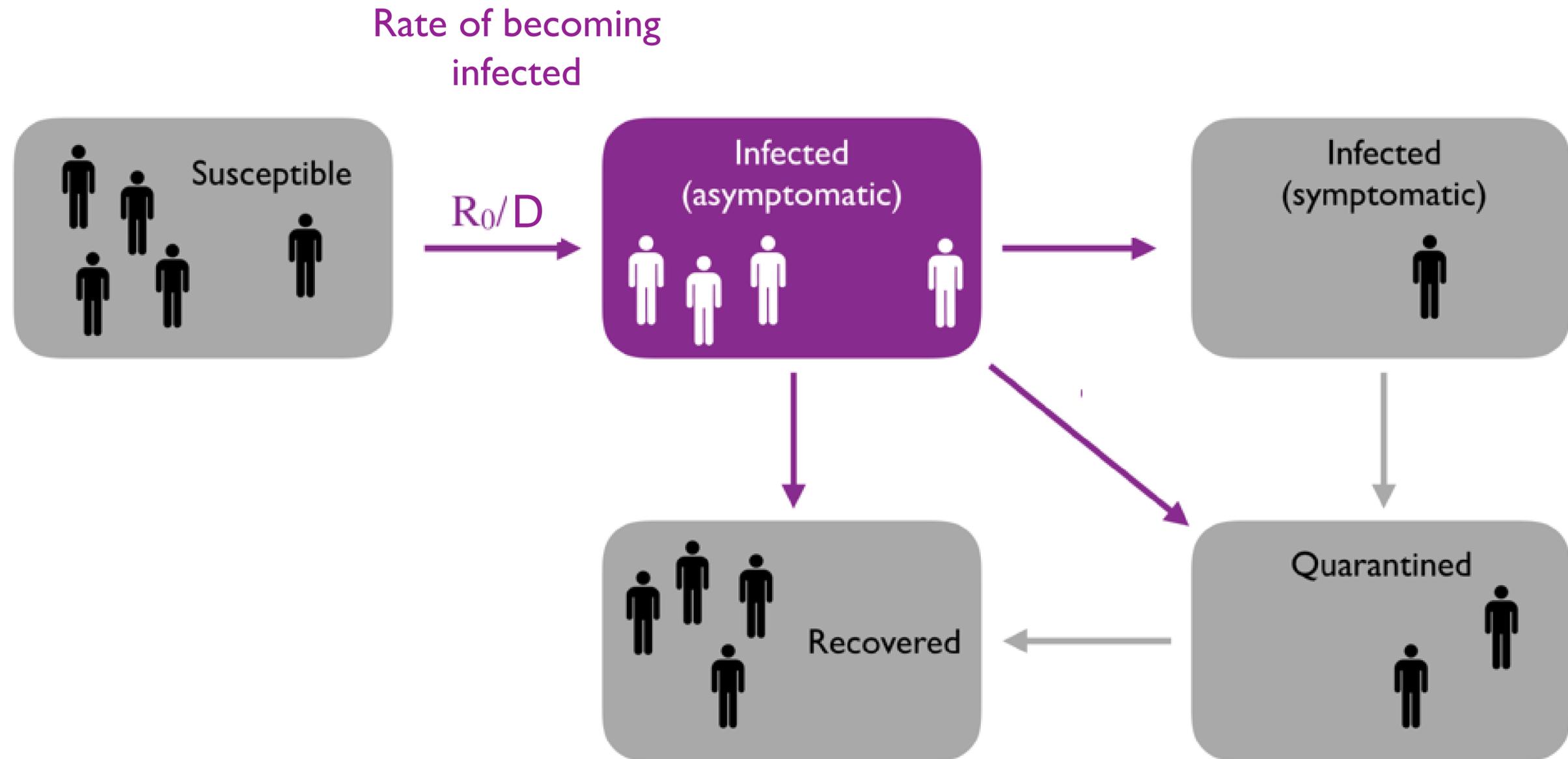
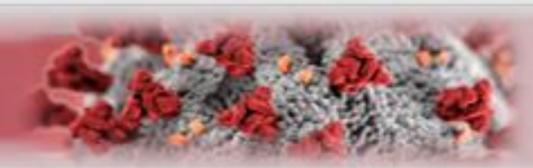


NOTE: No amount of testing or mitigation strategies can reduce the organization's infection rate below the community rate

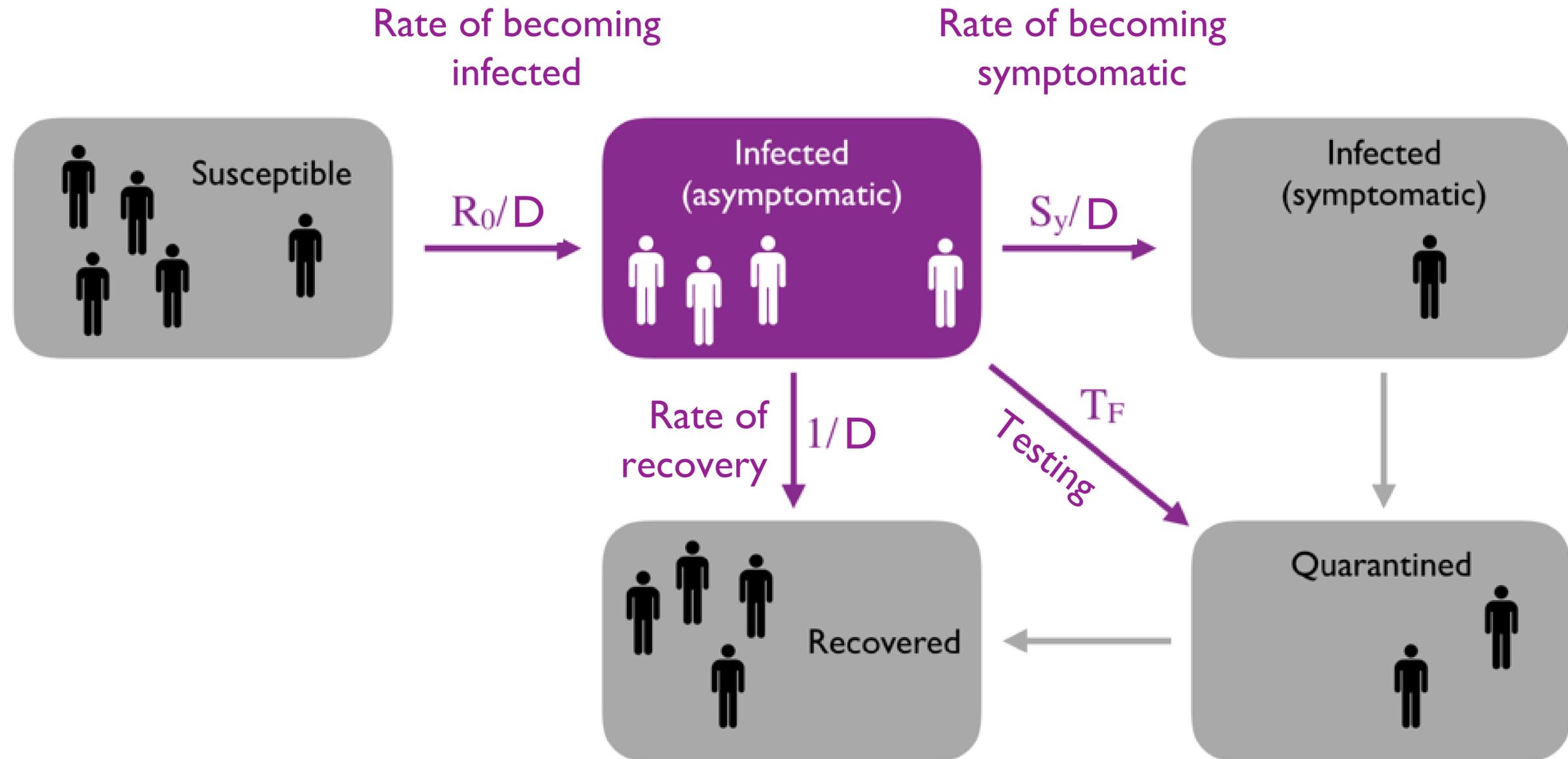
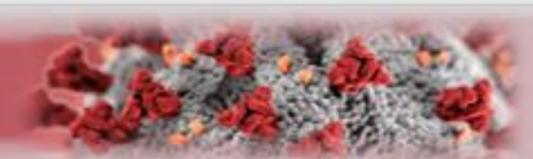
Counting Exercise



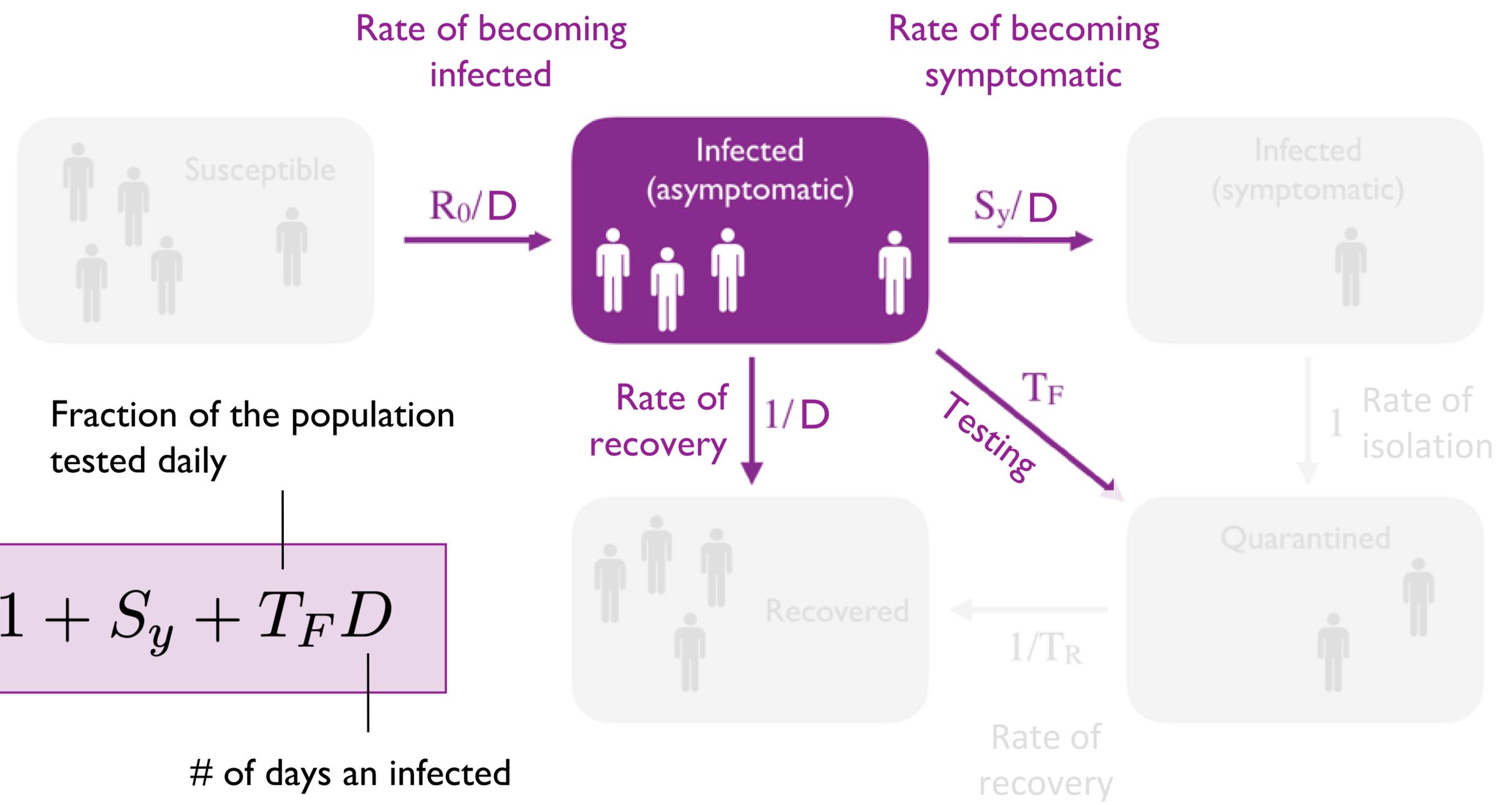
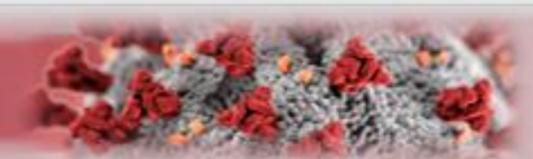
Counting Exercise



Counting Exercise

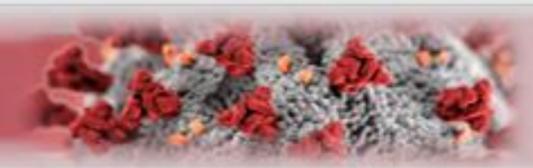


Counting Exercise



$$R_0 \leq 1 + S_y + T_F D$$

of days an infected person is contagious



Rate of moving people
into the purple box

$$R_0 \leq 1 + S_y + T_F D$$

Rate of moving people *out*
of the purple box

Social Distancing = reduce R_0

De-densification

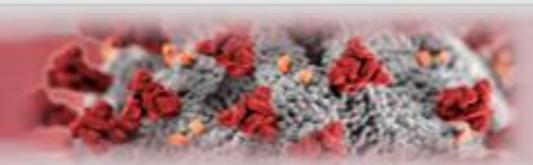
- **Improve hygiene**

Masks

- **Restrict movement/mobility**

Testing + Isolating:

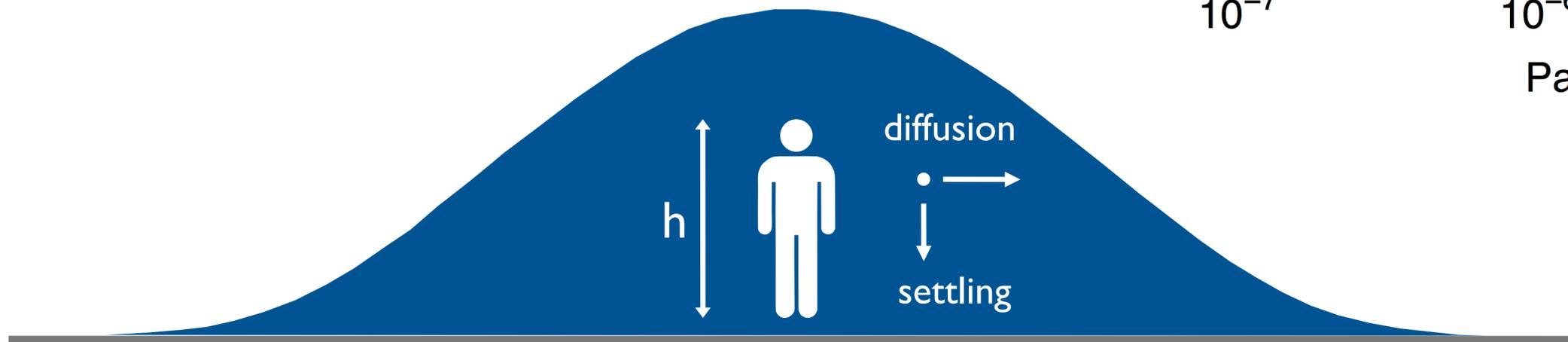
- Contact tracing
- Find high centrality people (people that infect many others)
- Find high centrality locations (hot spots)
- Health screening



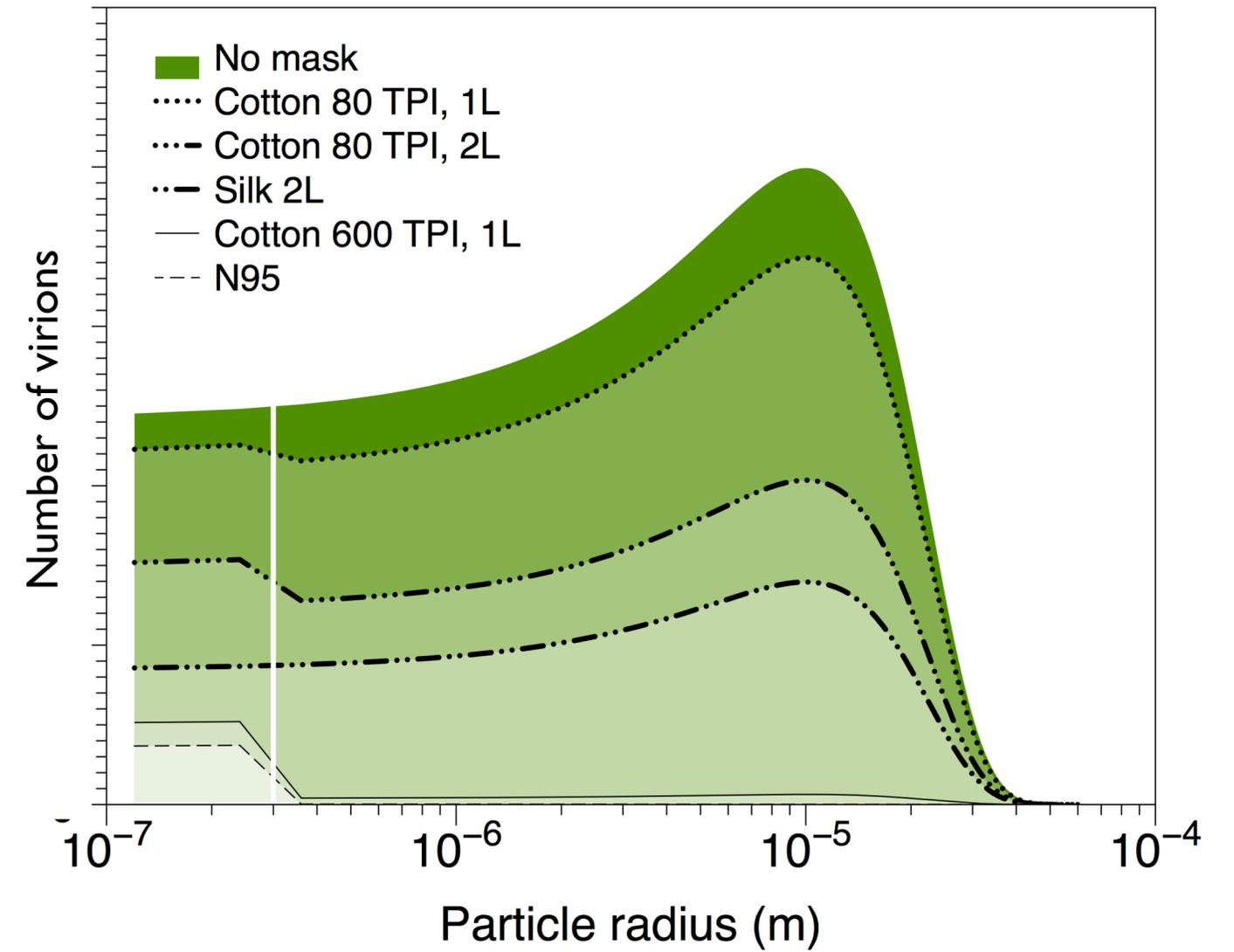
Fraction of population wearing masks

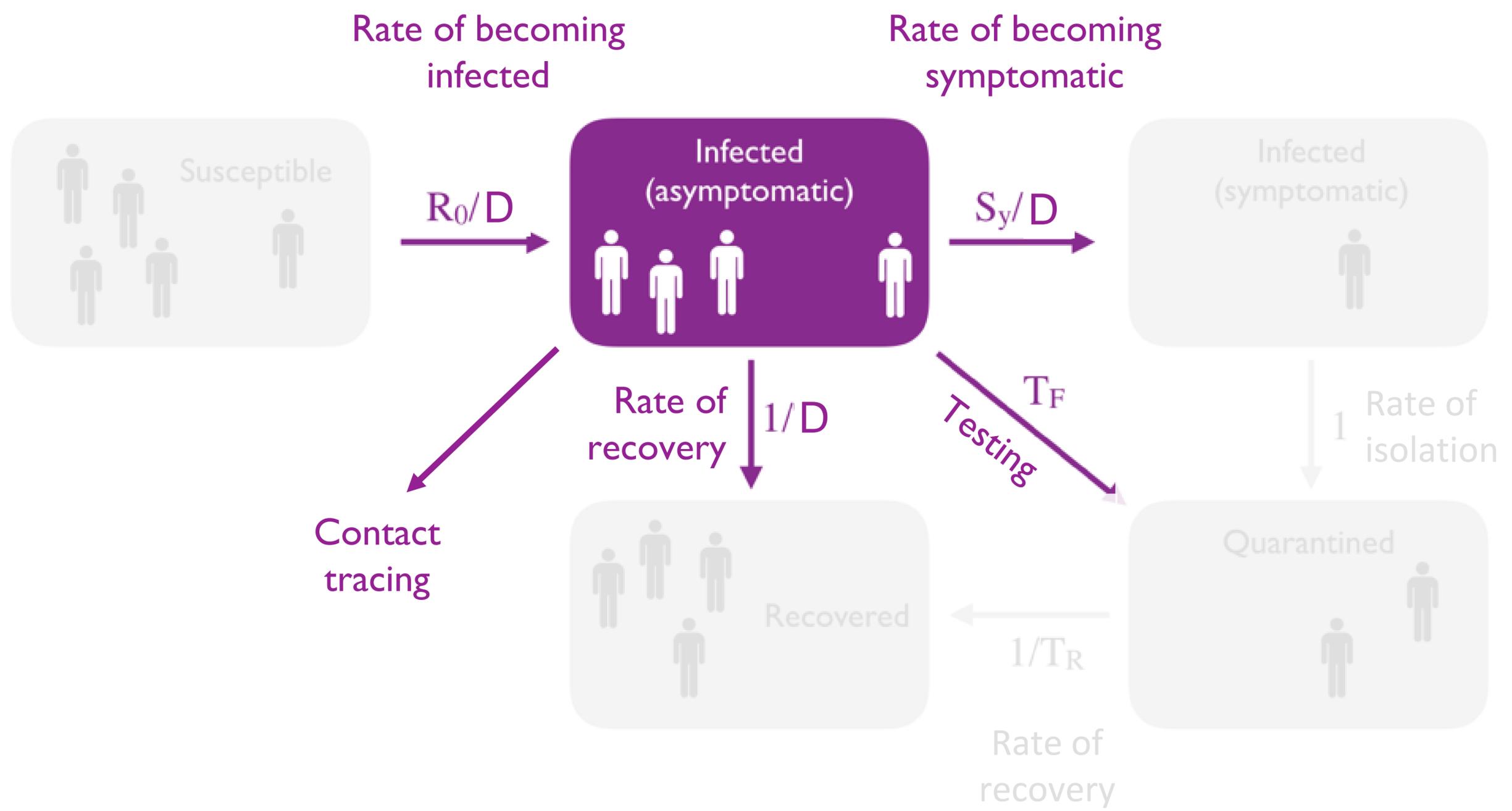
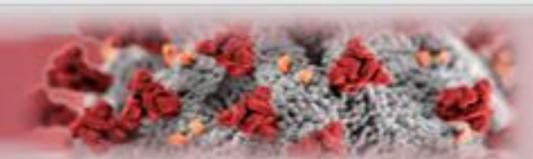
$$M(P, \beta) = (1 - P\beta)^2$$

Mask efficiency

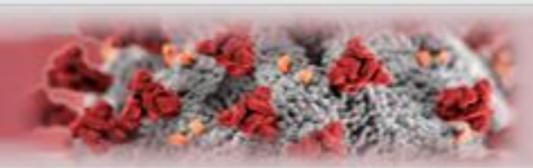


(See “Who was that masked man?” post for details)

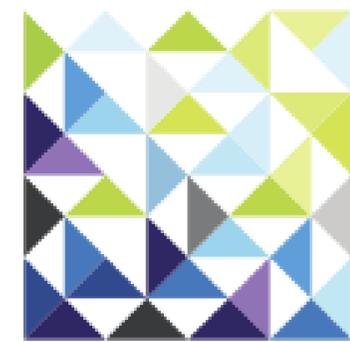




$$M(I-C) R_0 \leq 1 + S_y + T_F D \mathbf{s}$$



MIT INSTITUTE FOR DATA,
SYSTEMS, AND SOCIETY



IDSS

<https://idss.mit.edu/research/idss-covid-19-collaboration-isolat/>

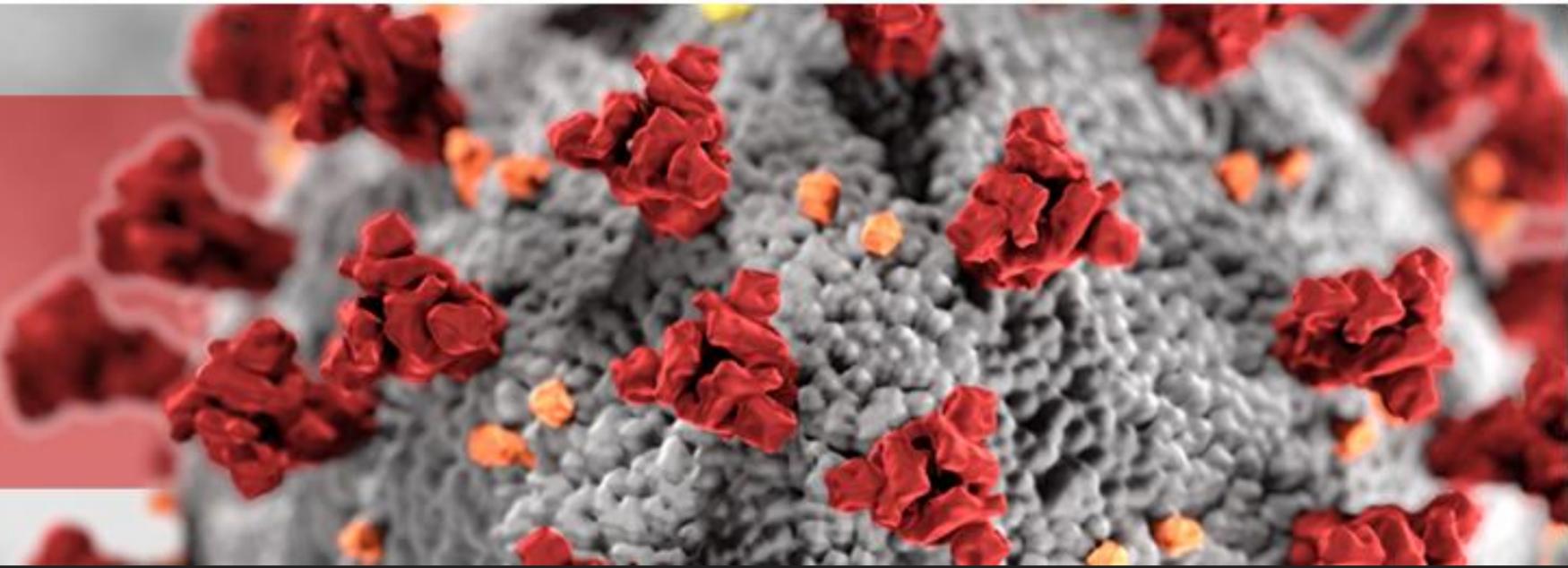


A testing approach to reduce the spread of COVID-19 within your organization

TESTING INFORMATION	
How many people need to be tested?	2000
If your employees will be paid for sample acquisition and/or testing time, what is the ave. hourly wage of those people (\$) ? (If not, enter "0".)	\$ 25
If you are paying people to acquire samples and/or perform testing, what is the hourly wage of those people (\$) ? (If not, enter "0".)	\$ 40
What percentage of people in your organization wear masks [%]	50 %
Does your organization have a <u>robust contact tracing program</u> ?	No
Does your organization have communal dining (e.g. a cafeteria) or other communal unmasked activities?	Yes
ASSUMPTIONS:	
Robust Contact Tracing: Find, test, and isolate - assumed INTERNAL contact tracing program.	
Testing is spaced evenly across five days a week.	
Lost wages include time for queuing (5min), sampling, and follow on testing of those that test positive (8 hrs lost)	

TEST OPTIONS (UNDER 'TYPICAL' CONDITIONS)				
	Test 1 POC instrument-based antigen test from nasal sample	Test 2 POC molecular test (e.g. PCR) from NP or nasal sample	Test 3 Testing contracted to lab with organization	Test 4 Testing contracted to central lab including sampling
Does test meet needed turnaround time	Yes	Yes	Yes	Yes
Number of people to be tested in a day	1000	1000	667	667
# people needing confirmatory test daily	22	20	20	20
Recommended max days between tests/person	2	2	3	3
Number of instruments required	32	32	0	0
Total instrument capital cost	\$56,000	\$320,000	\$0	\$0
Staff required	12	12	5	5
Cost per test	\$41.84	\$43.84	\$92.40	\$102.40
Daily test cost	\$41,840	\$43,840	\$61,630	\$68,300
Daily lost wage cost	\$7,808	\$7,375	\$6,253	\$6,253
Daily tracing cost	\$0	\$0	\$0	\$0
Expected number of infected people at home / day	16	17	16	16

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QUESTIONS

