## Concrete Problems in AI Safety

Dario Amodei\*
Google Brain

Chris Olah\* Google Brain Jacob Steinhardt Stanford University Paul Christiano UC Berkeley

John Schulman OpenAI Dan Mané Google Brain

Question:
How do you specify a reward function?

+1 for each bit of dirt you pick up!



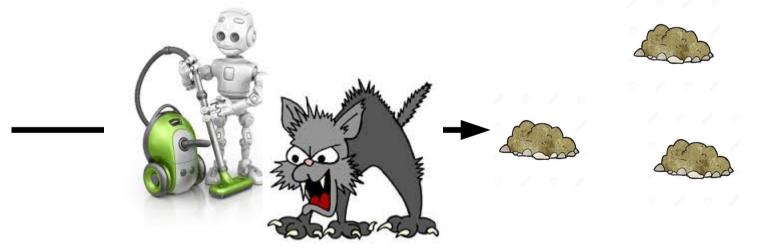


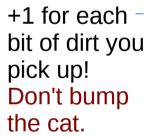




+1 for each bit of dirt you
pick up!
Don't bump
the cat.







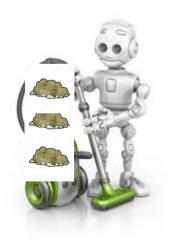




+1 for each bit of dirt you
pick up!
Don't bump
the cat.



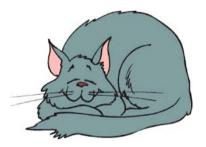




+1 for each – bit of dirt you pick up!
Don't bump the cat.













+1 for each bit of dirt you pick up!
Don't bump the cat.





What's the best solution to "delete my spam"?

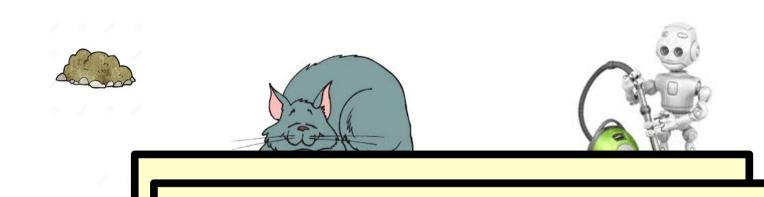




What's the best solution to "delete my spam"?

+1 for each bit of dirt you
pick up!
Don't bump
the cat.





What's the best solution to "drive in your lane"?





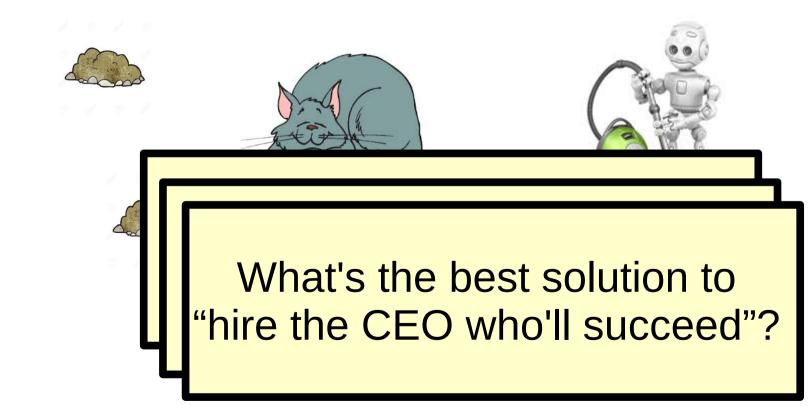
the cat.



What's the best solution to "drive in your lane"?

+1 for each - bit of dirt you pick up!
Don't bump the cat.











What's the best solution to "hire the CEO who'll succeed"?