Comments to Dawson from Jack

Diagram notes:

- Have a briefing slide that says the circle around rover = uncertainty
- Make the colors a little more distinct/dark, yellow -> orange -> red.
- So pod uncertainty is sum of rover uncert + deployment uncert, is it worth mentioning the ranging uncertainty? Or is that negligible/too complex for this diagram.
- Is adding an intended path and actual path too messy? It might help or make it more confusing, your call.

Actual notes:

- So, this is a scary problem as a drawing, but do we have any idea of how it might shake out quantitatively? If wcs each pod lands 1m from exact, I'm assuming we'll be out of bounds almost right away…
- Here's some bullshit math: In my mind, rover error should be minimized to only rms of pod error, so after 3 pod deployments that would be sqrt(1^2+1^2+1^2) = 1.73m. Then the next 3 deploy at sqrt((1.73+1)^2 + ….) = >4m, but what about the reduced error from the original 3 pods (so if we stay within range of all 6)
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Comments to Dawson from Jack

- What methods of error reduction could we employ?
  - Can we deploy a pod (aim 8m) and then take a range reading (say it gives 8.8m) then correct for that recursively?
  - We can estimate # of bounces using accelerometer data, assuming it’s possible to easily capture and return that data.
  - We can check things using the altimeters (maybe...seems unlikely)

1. Rover has some initial uncertainty

End

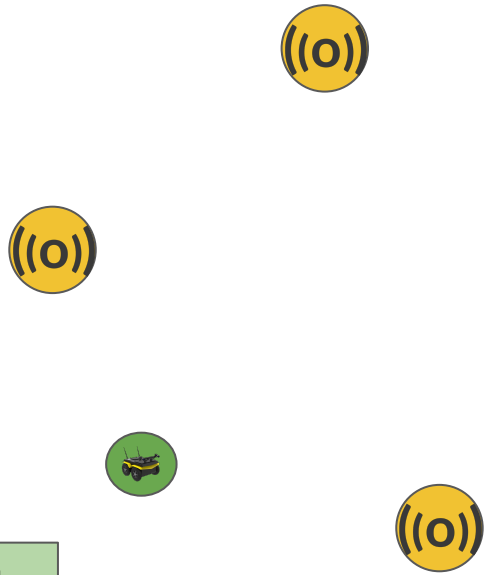
Circle represents
magnitude of uncertainty

Start

2. Rover deploys pods:

- Pod uncertainty is the sum of rover uncertainty and the uncertainty in deployment location[1]

End



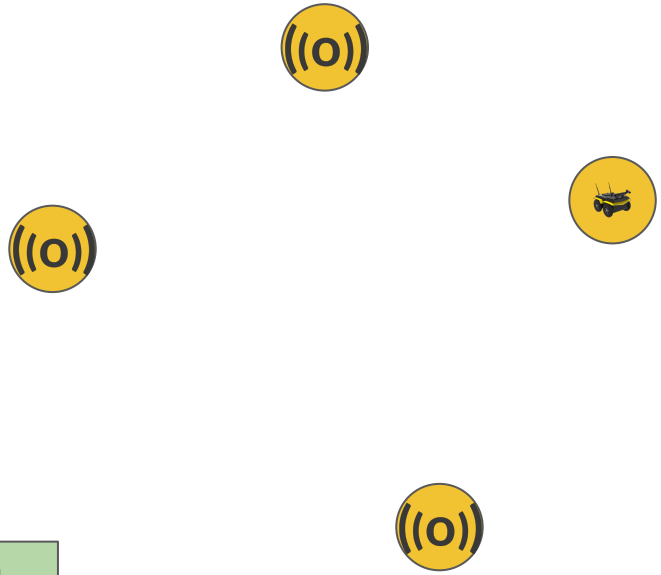
Start

[1] Deployment uncertainty can be determined either by characterization of deployment mechanism or by range from rover, whichever is more accurate

3. The uncertainty of the pods is now the best the rover can do in terms of accuracy

- IMU error grows very quickly, rover estimates using pod location

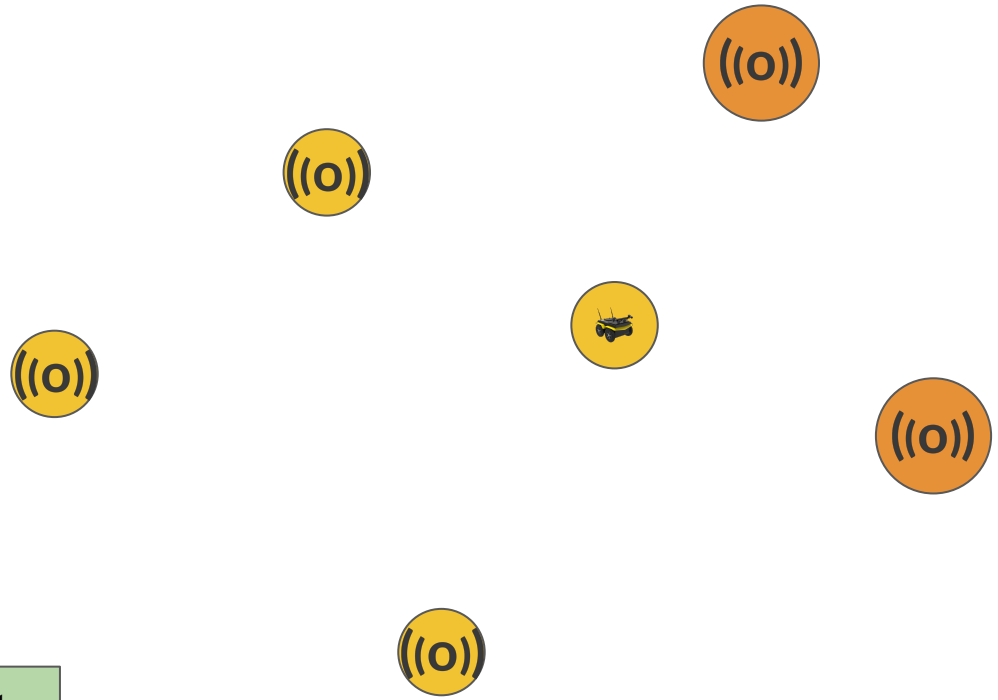
End



Start

4. As the rover gets out of range of the first set, needs to deploy new pods
   - This new pod has the uncertainty of the rover plus deployment uncertainty

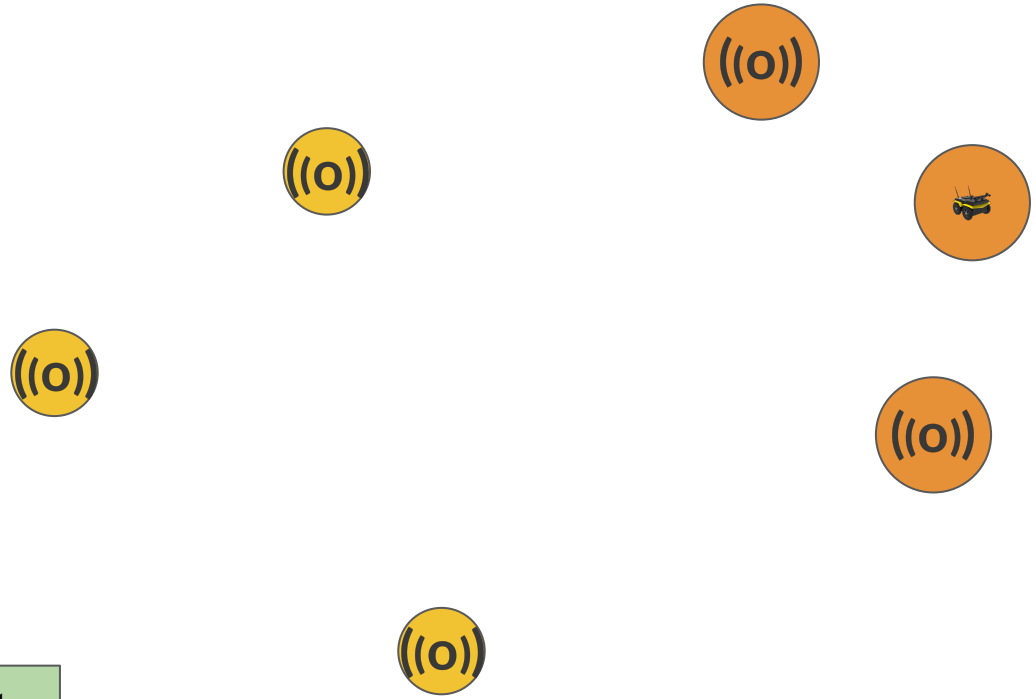
End



Start

End

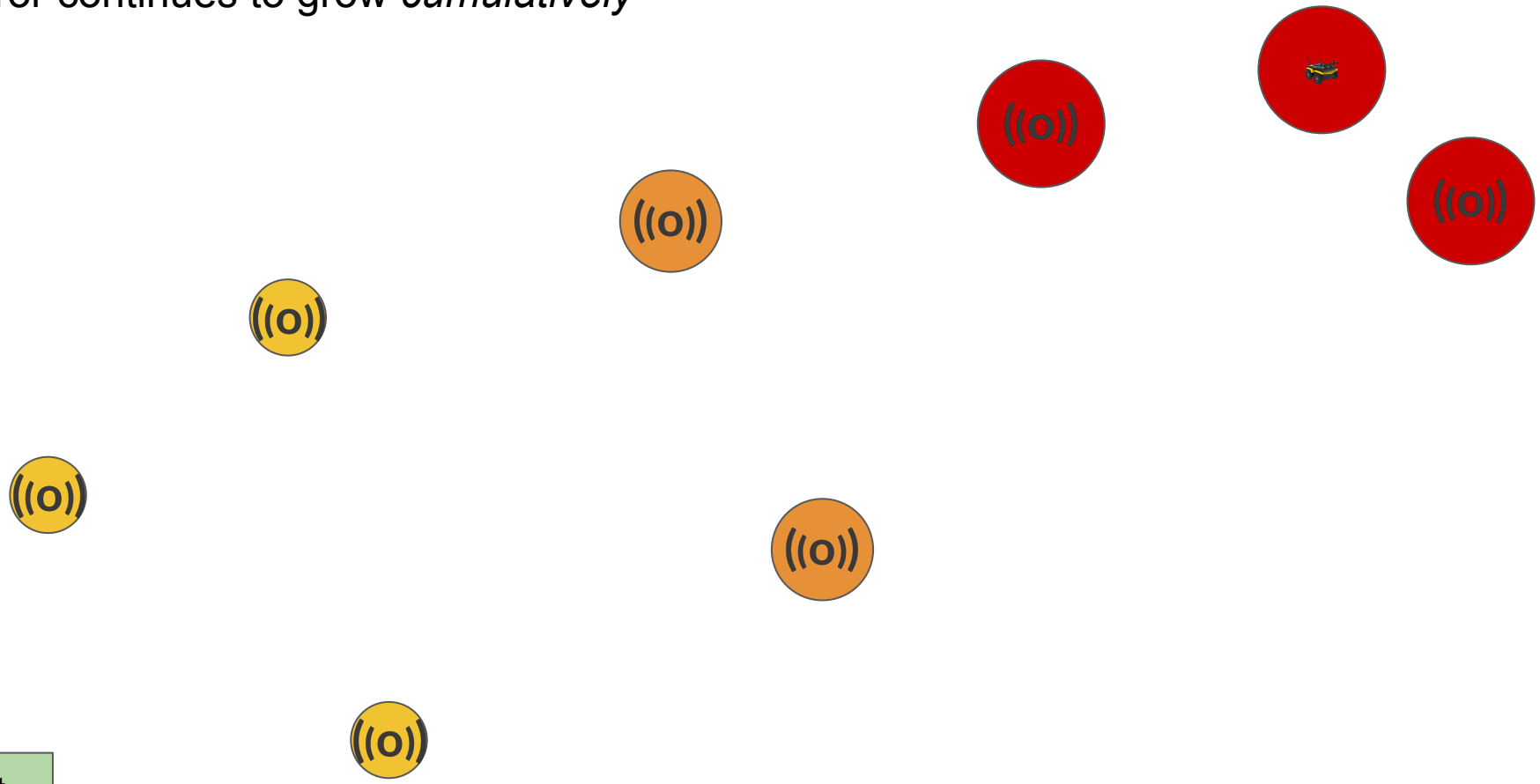
5. This new larger value is now the best the rover can do



Start

End

6. Error continues to grow *cumulatively*



Start

What this means

- We’re not limited by keeping range + deployment error less than 1 meter, we’re limited by keeping the *cumulative* error of repeated deployments less than 1 meter