

Recommendation:

Decide whether the deflection will be northward or southward.

Decision Needed

To decide whether to pursue northward or southward deflection.

- This decision will determine which impact prevention methods are feasible.
- Only the nuclear explosive device (NED) method can proceed without this choice.
- Northward would eliminate kinetic impactors (KI) as an option
- Timing of this decision directly affects mission development schedules

Benefits of Action

- Reduces trade space for potential courses of action
- Enables commitment of resources and development of deflection mission

Risks of Inaction

- Unable to finalize requirements for KI & IBD missions, thereby delaying schedule
- Delays may make NEDs the only viable option to prevent an Earth impact

Factors to Consider

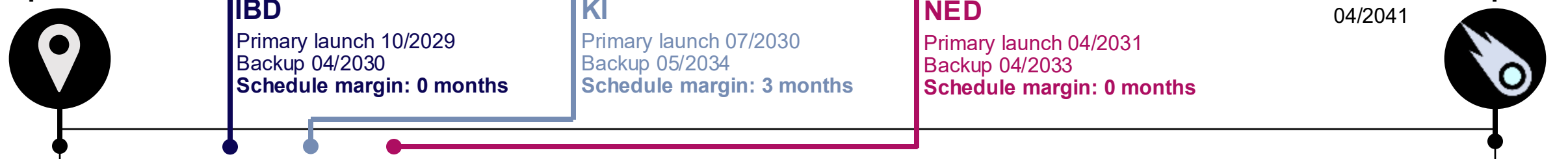
- Northward deflection corridor is ~6x more populated than the southward one.
- Northward requires moving the asteroid only half as far as the southward option

Analogue to Past Missions

- No previous missions have shifted an asteroid across a risk corridor.

Mission Schedule Implications, Assuming Decision Made This Month

April 2028



EXERCISE EXERCISE EXERCISE

Recommendation: If southward deflection is selected, decide whether a partial deflection option is considered safe/acceptable, then decide whether partial deflection or total deflection will be the mission goal.

Decision Needed

To decide whether to partially deflect the asteroid into the ocean or deflect it totally off the Earth.

- Mission requirements for partial deflection are less stringent due to shorter deflection distances
- This trade will drive aspects of mitigation mission implementation
- Timing of this decision affects schedule of missions to prevent Earth impact

Benefits of Action

- Settle on requirements needed to achieve successful deflection
- Enable mitigation missions to complete development and prepare for launch

Risks of Inaction

- Waiting until after 04/2028 will cause IBD and NED to miss their primary launch windows; decision needed by 07/2028 to preserve KI primary launch

Factors to Consider

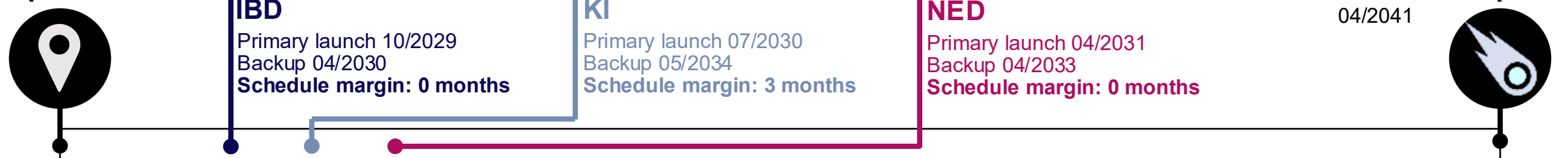
- Partial deflection requires IBD or NED
- KIs can provide some partial deflection, but IBD or NED would also be needed to adjust asteroid impact location precisely

Analogues to Past Missions

- No missions to date have attempted to change an asteroid's trajectory with this degree of accuracy and precision.

Mission Schedule Implications, Assuming Decision Made This Month

April 2028



EXERCISE EXERCISE EXERCISE

EXERCISE EXERCISE EXERCISE

Recommendation: Select a deflection mission type—kinetic impact (KI), ion beam deflection (IBD) or nuclear explosive device (NED)—complete its development, and deploy it.

Decision Needed

To select which type of deflection mission (KI, IBD, or NED) will be fully developed and deployed.

- Multiple issues must be considered, such as technical maturity, cost, supply chain, and political factors.
- Each type of deflection mission (KI, IBD, NED) involves novel design elements that introduce different risks depending on the mission

Benefits of Action

- Stop the asteroid from hitting Earth, preventing loss of life/infrastructure
- Proceeding with a mission now preserves options down the road

Risks of Inaction

- Asteroid will impact Earth, causing regional devastation
- Delayed future actions have higher costs
- Some missions will become impossible

Factors to Consider

- KI requires multiple spacecraft, and performance is challenging to predict
- IBD requires several complex ~10,000 kg spacecraft built on a tight schedule
- NEDs are politically and legally fraught, but requires only one spacecraft

Analques to Past Missions

- DART demonstrated successful kinetic impact deflection with a single spacecraft
- Psyche, Dawn, Hayabusa2 proved long duration low thrust but not deflection
- NEDs have been detonated in LEO (Starfish Prime) but not deep space

Mission Implications

April 2028



IBD

Primary launch 10/2029
Backup 04/2030
Schedule margin: 0 months

KI

Primary launch 07/2030
Backup 05/2034
Schedule margin: 3 months

NED

Primary launch 04/2031
Backup 04/2033
Schedule margin: 0 months

Potential impact
04/2041



EXERCISE EXERCISE EXERCISE