

Resultados de la reparación:

a.) Utilizando el primero árbol T1 de cada problema, analizamos en una tabla:

1. La cantidad de fallos que hacemos.
2. El tiempo promedio que tarda en encontrar o no un plan, junto con su desviación estándar.
3. La cantidad de veces que encuentra un plan.
4. El número de acciones dentro de la ventana de reparación.

EVA: Vamos a unificar nombres:

- Al planning horizon lo vamos a llamar repairing window.
 - Al número de acciones dentro de la repairing window lo denominamos repairing window length.
 - A la profundidad del árbol lo vamos a denominar 'plan length horizon', tal y como comentaba Jeremy.
 - Por tanto, un intervalo [4,5] representa una repairing window que contiene 4 acciones, y un árbol de profundidad 5.
 - Podemos usar luego la notación: $\langle 4,5,1 \rangle$ para indicar que se está reparando la primera acción de la ventana, o $\langle 4,5,3 \rangle$ para indicar que se está reparando la tercera acción de la ventana.
5. El número de acciones con las que repara el plan.
 6. La cantidad de acciones del punto 5. que se encuentran en el punto 4.

b.) Y ver dos ejemplos de tipos de fallo, en los que:

1. Mencionemos el fallo producido: el fallo siempre va a ser que falla una precondition de la siguiente acción.
2. Y mostrar, si la reparación se está produciendo para ejecutar de nuevo la acción que ha fallado o bien una acción posterior.

A continuación están todos los tipos de fallo que tenemos. Yo me inclinaría por el 6.) y el 7.) .

Mañana me dedico (en las horas de la tarde) exclusivamente a realizar la parte **a.) Utilizando el primero árbol T1 de cada problema, analizamos en una tabla.**

1.) TIPO DE FALLO 1: NO SE PUEDE TOMAR LA IMAGEN PORQUE EL OBJETIVO1 NO ES VISIBLE DESDE EL WAYPOINT3.

Quedan tres acciones por ejecutar, en un árbol con una profundidad de 5. Por lo que tenemos un margen de 2 acciones. En este ejemplo, la reparación se hace para ejecutar una acción posterior a la que ha fallado. Es decir:

```
2: (communicate_image_data rover0 general objective1 high_res waypoint3 waypoint0) [1]
3: (sample_rock rover0 rover0store waypoint3) [1]
```

Concretamente, el rover toma la foto del objective1 desde el waypoint0 y regresa al waypoint3 para comunicar los resultados.

EVA: A mi me gusta este fallo ... mete tres acciones y repara hasta una acción que no es la primera del plan original

```
*****
Rovers - pfile1 ,
SEARCH TREE=1 ,
TIME STEP=1
WINDOW=4 ,
DEPTH=5
*****
```

b) Random failures: by exogenous events

```
= <have_image-rover0-objective1-high_res,not>
= <supports-camera0-high_res,true>
= <calibrated-camera0-rover0,yes>
= <at-rover0,waypoint3>
= <on_board-camera0,rover0>
= <equipped_for_imaging-rover0,yes>
- <visible_from-objective1-waypoint3,true> changed by <visible_from-objective1-waypoint3,false>]
```

Original plan:

; Version LPG-td-1.0

```
1: (take_image rover0 waypoint3 objective1 camera0 high_res) [1]
2: (communicate_image_data rover0 general objective1 high_res waypoint3 waypoint0) [1]
3: (sample_rock rover0 rover0store waypoint3) [1]
```

Destiny found: 39 [<status-rover0store,empty>, <can_traverse-rover0-waypoint3-waypoint1,true>, <equipped_for_soil_analysis-rover0,yes>, <equipped_for_rock_analysis-rover0,yes>, <have_image-rover0-objective1-high_res,not>, <have_rock_analysis-rover0-waypoint3,not>, <supports-camera0-high_res,true>, <calibrated-camera0-rover0,yes>, <at_lander-general,waypoint0>, <visible-waypoint3-waypoint0,true>, <at-rover0,waypoint3>, <at_rock_sample-waypoint3,yes>, <visible-waypoint2-waypoint0,true>, <have_soil_analysis-rover0-waypoint2,not>, <on_board-camera0,rover0>, <can_traverse-rover0-waypoint1-waypoint2,true>, <equipped_for_imaging-rover0,yes>, <visible_from-objective1-waypoint3,true>, <at_soil_sample-waypoint2,yes>, <store_of-rover0store,rover0>]

Origin found: 262 [<status-rover0store,empty>, <can_traverse-rover0-waypoint3-waypoint0,true>, <can_traverse-rover0-waypoint3-waypoint1,true>, <equipped_for_soil_analysis-rover0,yes>, <equipped_for_rock_analysis-rover0,yes>, <have_image-rover0-objective1-high_res,not>, <have_rock_analysis-rover0-waypoint3,not>, <supports-camera0-high_res,true>, <calibrated-camera0-rover0,yes>, <at_lander-general,waypoint0>, <visible-waypoint3-waypoint0,true>, <at_rock_sample-waypoint3,yes>, <at-rover0,waypoint3>, <visible-waypoint2-waypoint0,true>, <can_traverse-rover0-waypoint0-waypoint3,true>, <visible_from-objective1-waypoint0,true>, <have_soil_analysis-rover0-waypoint2,not>, <on_board-camera0,rover0>, <can_traverse-rover0-waypoint1-waypoint2,true>, <equipped_for_imaging-rover0,yes>, <at_soil_sample-waypoint2,yes>, <store_of-rover0store,rover0>]

Repaired plan (RP):

```
0.0:navigate rover0 waypoint3 waypoint0
1.0:take_image rover0 waypoint0 objective1 camera0 high_res
2.0:navigate rover0 waypoint0 waypoint3
3.0:communicate_image_data rover0 general objective1 high_res waypoint3 waypoint0
4.0:sample_rock rover0 rover0store waypoint3
5.0:drop rover0 rover0store
```

```
6.0:navigate rover0 waypoint3 waypoint1
7.0:navigate rover0 waypoint1 waypoint2
8.0:communicate_rock_data rover0 general waypoint3 waypoint2 waypoint0
9.0:sample_soil rover0 rover0store waypoint2
10.0:communicate_soil_data rover0 general waypoint2 waypoint2 waypoint0
```

Search time: 351600.0 ns

2.) TIPO DE FALLO 2: FALLOS POSITIVOS.

Se fallos que benefician a la ejecución del plan. En este ejemplo, el rover detecta que la camara ya está calibrada.

EVA: tampoco está mal este tipo de fallo para ver una sinergia positiva

```
*****
Rovers - pfile1
SEARCH TREE=1
TIME STEP=0
WINDOW=4
DEPTH=5
*****
```

b) Random failures: by exogenous events

```
= <calibration_target-camera0,objective1>
- <calibrated-camera0-rover0,not> changed by <calibrated-camera0-rover0,yes>]
= <at-rover0,waypoint3>
= <on_board-camera0,rover0>
= <equipped_for_imaging-rover0,yes>
= <visible_from-objective1-waypoint3,true>
```

Original plan:

; Version LPG-td-1.0

```
0: (calibrate rover0 camera0 objective1 waypoint3) [1]
1: (take_image rover0 waypoint3 objective1 camera0 high_res) [1]
2: (communicate_image_data rover0 general objective1 high_res waypoint3 waypoint0) [1]
3: (sample_rock rover0 rover0store waypoint3) [1]
```

Destiny found: 103 [<status-rover0store,empty>, <can_traverse-rover0-waypoint3-waypoint1,true>, <calibration_target-camera0,objective1>, <equipped_for_soil_analysis-rover0,yes>, <equipped_for_rock_analysis-rover0,yes>, <have_image-rover0-objective1-high_res,not>, <have_rock_analysis-rover0-waypoint3,not>, <supports-camera0-high_res,true>, <calibrated-camera0-rover0,not>, <at_lander-general,waypoint0>, <visible-waypoint3-waypoint0,true>, <at-rover0,waypoint3>, <at_rock_sample-waypoint3,yes>, <visible-waypoint2-waypoint0,true>, <have_soil_analysis-rover0-waypoint2,not>, <on_board-camera0,rover0>, <can_traverse-rover0-waypoint1-waypoint2,true>, <equipped_for_imaging-rover0,yes>, <visible_from-objective1-waypoint3,true>, <at_soil_sample-waypoint2,yes>, <store_of-rover0store,rover0>]

Origin found: 39 [<status-rover0store,empty>, <can_traverse-rover0-waypoint3-waypoint1,true>, <equipped_for_soil_analysis-rover0,yes>, <equipped_for_rock_analysis-rover0,yes>, <have_image-rover0-objective1-high_res,not>, <have_rock_analysis-rover0-waypoint3,not>, <supports-camera0-high_res,true>, <calibrated-camera0-rover0,yes>, <at_lander-general,waypoint0>, <visible-waypoint3-waypoint0,true>, <at-rover0,waypoint3>, <at_rock_sample-waypoint3,yes>, <visible-waypoint2-waypoint0,true>, <have_soil_analysis-rover0-waypoint2,not>, <on_board-camera0,rover0>, <can_traverse-rover0-waypoint1-waypoint2,true>, <equipped_for_imaging-rover0,yes>, <visible_from-objective1-waypoint3,true>, <at_soil_sample-waypoint2,yes>, <store_of-rover0store,rover0>]

Repaired plan (RP):

```
0.0:take_image rover0 waypoint3 objective1 camera0 high_res
1.0:communicate_image_data rover0 general objective1 high_res waypoint3 waypoint0
2.0:sample_rock rover0 rover0store waypoint3
3.0:drop rover0 rover0store
4.0:navigate rover0 waypoint3 waypoint1
5.0:navigate rover0 waypoint1 waypoint2
```

```
6.0:communicate_rock_data rover0 general waypoint3 waypoint2 waypoint0
7.0:sample_soil rover0 rover0store waypoint2
8.0:communicate_soil_data rover0 general waypoint2 waypoint2 waypoint0
```

Search time: 375815.0 ns

4.) TIPO DE FALLO 4: CONEXIÓN ENTRE LOS WAYPOINTS - LINKS.

- ROVER CAMBIA DE POSICIÓN.

EVA: Este es el clásico fallo de un rover que no está en su sitio y se tiene que desplazar ... para eso, yo pondría el fallo 1) que queda mejor y es también una reparación de movimiento.

```
*****
Rovers - pfile1
SEARCH TREE=1
TIME STEP=2
WINDOW=4
DEPTH=5
*****
```

b) Random failures: by exogenous events

```
= <visible-waypoint3-waypoint0,true>
- <at-rover0,waypoint3> changed by <at-rover0,waypoint1>]
= <at_lander-general,waypoint0>
= <have_image-rover0-objective1-high_res,yes>
```

Original plan:

; Version LPG-td-1.0

2: (communicate_image_data rover0 general objective1 high_res waypoint3 waypoint0) [1]

3: (sample_rock rover0 rover0store waypoint3) [1]

Destiny found: 13 [<can_traverse-rover0-waypoint1-waypoint2,true>, <have_soil_analysis-rover0-waypoint2,not>, <visible-waypoint3-waypoint0,true>, <can_traverse-rover0-waypoint3-waypoint1,true>, <equipped_for_soil_analysis-rover0,yes>, <at-rover0,waypoint3>, <have_rock_analysis-rover0-waypoint3,not>, <visible-waypoint2-waypoint0,true>, <at_lander-general,waypoint0>, <have_image-rover0-objective1-high_res,yes>, <status-rover0store,empty>, <at_soil_sample-waypoint2,yes>, <equipped_for_rock_analysis-rover0,yes>, <store_of-rover0store,rover0>, <at_rock_sample-waypoint3,yes>]

Origin found: 41 [<can_traverse-rover0-waypoint1-waypoint3,true>, <can_traverse-rover0-waypoint1-waypoint2,true>, <have_soil_analysis-rover0-waypoint2,not>, <have_rock_analysis-rover0-waypoint3,not>, <visible-waypoint2-waypoint0,true>, <at_lander-general,waypoint0>, <visible-waypoint3-waypoint0,true>, <can_traverse-rover0-waypoint3-waypoint1,true>, <equipped_for_soil_analysis-rover0,yes>, <status-rover0store,empty>, <have_image-rover0-objective1-high_res,yes>, <at_soil_sample-waypoint2,yes>, <equipped_for_rock_analysis-rover0,yes>, <store_of-rover0store,rover0>, <at_rock_sample-waypoint3,yes>, <at-rover0,waypoint1>]

Repaired plan (RP):

0.0:navigate rover0 waypoint1 waypoint3

1.0:communicate_image_data rover0 general objective1 high_res waypoint3 waypoint0

2.0:sample_rock rover0 rover0store waypoint3

3.0:drop rover0 rover0store

4.0:navigate rover0 waypoint3 waypoint1

5.0:navigate rover0 waypoint1 waypoint2

6.0:communicate_rock_data rover0 general waypoint3 waypoint2 waypoint0

7.0:sample_soil rover0 rover0store waypoint2

8.0:communicate_soil_data rover0 general waypoint2 waypoint2 waypoint0

Search time: 177187.0 ns

5.) TIPO DE FALLO 4: CONEXIÓN ENTRE LOS WAYPOINTS - LINKS.

- **ROVER CAMBIA DE POSICIÓN, PERO EN ESTE SE VE COMO REPARA HASTA EL NODO RAÍZ. AUNQUE UTILIZA TRES DE LAS MISMAS ACCIONES PERO EN DIFERENTE ORDEN, POR LO TANTO ESTA DIRIGIENDO LA BUSQUEDA AL NODO RAÍZ.**

EVA: OJO!! aquí hay 2 rovers ... se me olvidó hablar el otro día de los fallos cuando hay más de un rover. Sí, repara hasta el nodo raíz pero en realidad luego añade las acciones del otro rover.

Tampoco está mal este tipo de fallo.

```
*****  
Rovers - pfile8  
SEARCH TREE=1  
TIME STEP=0  
WINDOW=4  
DEPTH=5  
*****
```

b) Random failures: by exogenous events

```
= <can_traverse-rover3-waypoint3-waypoint0,true>  
- <at-rover3, waypoint3> changed by <at-rover3, waypoint1>]
```

Original plan:

; Version LPG-td-1.0

0: (navigate rover3 waypoint3 waypoint0) [1]

1: (navigate rover0 waypoint2 waypoint4) [1]

2: (sample_rock rover0 rover0store waypoint4) [1]

3: (calibrate rover3 camera0 objective1 waypoint0) [1]

Destiny found: 188 [<status-rover3store,empty>, <can_traverse-rover3-waypoint3-waypoint0,true>, <have_soil_analysis-rover0-waypoint4,not>, <visible-waypoint4-waypoint0,true>, <have_soil_analysis-rover0-waypoint3,not>, <have_image-rover1-objective2-low_res,not>, <calibrated-camera0-rover3,not>, <visible_from-objective0-waypoint1,true>, <supports-camera1-high_res,true>, <visible_from-objective0-waypoint2,true>, <store_of-rover1store,rover1>, <have_rock_analysis-rover0-waypoint4,not>, <visible-waypoint2-waypoint0,true>, <calibrated-camera1-rover3,not>, <at_rock_sample-waypoint5,yes>, <at_rock_sample-waypoint4,yes>, <calibration_target-camera0,objective1>, <calibration_target-camera1,objective0>, <calibration_target-camera2,objective0>, <supports-camera2-low_res,true>, <equipped_for_soil_analysis-rover3,yes>, <visible-waypoint3-waypoint0,true>, <equipped_for_soil_analysis-rover0,yes>, <at-rover3, waypoint3>, <at-rover1, waypoint2>, <at-rover0, waypoint2>, <store_of-rover3store,rover3>, <visible_from-objective1-waypoint0,true>, <can_traverse-rover0-waypoint4-waypoint2,true>, <have_rock_analysis-rover1-waypoint5,not>, <can_traverse-rover3-waypoint0-waypoint1,true>, <can_traverse-rover1-waypoint5-waypoint2,true>, <equipped_for_imaging-rover3,yes>, <status-rover1store,empty>, <equipped_for_imaging-rover1,yes>, <calibrated-camera2-rover1,not>, <have_soil_analysis-rover3-waypoint1,not>, <have_image-rover3-objective0-low_res,not>, <supports-camera0-low_res,true>, <visible-waypoint1-waypoint0,true>, <equipped_for_rock_analysis-rover0,yes>, <equipped_for_rock_analysis-rover1,yes>, <can_traverse-rover1-waypoint2-waypoint5,true>, <can_traverse-rover0-waypoint2-waypoint3,true>, <can_traverse-rover0-waypoint2-waypoint4,true>, <have_image-rover3-objective0-high_res,not>, <visible_from-objective2-waypoint2,true>, <on_board-camera2,rover1>, <on_board-camera1,rover3>, <on_board-camera0,rover3>, <at_soil_sample-waypoint3,yes>, <at_soil_sample-waypoint4,yes>, <at_lander-general, waypoint0>, <at_soil_sample-waypoint1,yes>, <status-rover0store,empty>, <store_of-rover0store,rover0>]

Origin found: 190 [<status-rover3store,empty>, <have_soil_analysis-rover0-waypoint4,not>, <visible-waypoint4-waypoint0,true>, <have_soil_analysis-rover0-waypoint3,not>, <have_image-rover1-objective2-low_res,not>, <calibrated-camera0-rover3,not>, <visible_from-objective0-waypoint1,true>, <supports-camera1-high_res,true>, <visible_from-objective0-waypoint2,true>, <store_of-rover1store,rover1>, <have_rock_analysis-rover0-waypoint4,not>, <visible-waypoint2-waypoint0,true>, <calibrated-camera1-rover3,not>, <at_rock_sample-waypoint5,yes>, <at_rock_sample-waypoint4,yes>, <calibration_target-camera0,objective1>, <calibration_target-camera1,objective0>, <calibration_target-camera2,objective0>, <supports-camera2-low_res,true>, <equipped_for_soil_analysis-rover3,yes>, <visible-waypoint3-waypoint0,true>, <equipped_for_soil_analysis-rover0,yes>, <at-rover3, waypoint1>, <at-rover1, waypoint2>, <at-rover0, waypoint2>, <store_of-rover3store,rover3>, <visible_from-objective1-waypoint0,true>, <can_traverse-rover0-waypoint4-waypoint2,true>, <have_rock_analysis-rover1-waypoint5,not>, <can_traverse-rover3-waypoint0-waypoint1,true>, <can_traverse-rover1-waypoint5-waypoint2,true>, <equipped_for_imaging-rover3,yes>, <status-rover1store,empty>, <equipped_for_imaging-rover1,yes>, <calibrated-camera2-rover1,not>, <have_soil_analysis-rover3-waypoint1,not>, <have_image-rover3-objective0-low_res,not>, <supports-camera0-low_res,true>, <can_traverse-rover3-waypoint1-waypoint0,true>,

<visible-waypoint1-waypoint0,true>, <equipped_for_rock_analysis-rover0,yes>, <equipped_for_rock_analysis-rover1,yes>,
<can_traverse-rover1-waypoint2-waypoint5,true>, <can_traverse-rover0-waypoint2-waypoint3,true>, <can_traverse-rover0-waypoint2-
waypoint4,true>, <have_image-rover3-objective0-high_res,not>, <visible_from-objective2-waypoint2,true>, <on_board-
camera2,rover1>, <on_board-camera1,rover3>, <on_board-camera0,rover3>, <at_soil_sample-waypoint3,yes>, <at_soil_sample-
waypoint4,yes>, <at_lander-general,waypoint0>, <at_soil_sample-waypoint1,yes>, <status-rover0store,empty>, <store_of-
rover0store,rover0>]

0: (navigate rover3 waypoint3 waypoint0) [1]
1: (navigate rover0 waypoint2 waypoint4) [1]
2: (sample_rock rover0 rover0store waypoint4) [1]
3: (calibrate rover3 camera0 objective1 waypoint0) [1]

Repaired plan (RP):

0.0:navigate rover3 waypoint1 waypoint0
1.0:calibrate rover3 camera0 objective1 waypoint0
2.0:navigate rover0 waypoint2 waypoint4
3.0:sample_rock rover0 rover0store waypoint4
4.0:navigate rover3 waypoint0 waypoint1
5.0:sample_soil rover3 rover3store waypoint1
6.0:communicate_soil_data rover3 general waypoint1 waypoint1 waypoint0
7.0:communicate_rock_data rover0 general waypoint4 waypoint4 waypoint0
8.0:navigate rover1 waypoint2 waypoint5
9.0:sample_rock rover1 rover1store waypoint5
10.0:navigate rover1 waypoint5 waypoint2
11.0:communicate_rock_data rover1 general waypoint5 waypoint2 waypoint0
12.0:take_image rover3 waypoint1 objective0 camera0 low_res
13.0:communicate_image_data rover3 general objective0 low_res waypoint1 waypoint0
14.0:calibrate rover1 camera2 objective0 waypoint2
15.0:take_image rover1 waypoint2 objective2 camera2 low_res
16.0:communicate_image_data rover1 general objective2 low_res waypoint2 waypoint0
17.0:calibrate rover3 camera1 objective0 waypoint1
18.0:take_image rover3 waypoint1 objective0 camera1 high_res
19.0:communicate_image_data rover3 general objective0 high_res waypoint1 waypoint0
20.0:drop rover0 rover0store
21.0:sample_soil rover0 rover0store waypoint4
22.0:communicate_soil_data rover0 general waypoint4 waypoint4 waypoint0
23.0:navigate rover0 waypoint4 waypoint2
24.0:navigate rover0 waypoint2 waypoint3
25.0:drop rover0 rover0store
26.0:sample_soil rover0 rover0store waypoint3
27.0:communicate_soil_data rover0 general waypoint3 waypoint3 waypoint0

Search time: 421491.0 ns

6.) TIPO DE FALLO 5: ACTION SEEK FOR A ROCKS FOR SOILS

EVA: El fallo es algo distinto pero tampoco la reparación tiene mucha gracia

Rovers - pfile2
SEARCH TREE=1
TIME STEP=3
WINDOW=4
DEPTH=5

b) Random failures: by exogenous events

- <at_rock_sample-waypoint0,yes> changed by <at_rock_sample-waypoint0,not>]
= <have_rock_analysis-rover0-waypoint0,not>
= <communicated_image_data-objective1-low_res,true>
= <status-rover0store,empty>

```
= <equipped_for_rock_analysis-rover0,yes>
= <store_of-rover0store,rover0>
= <at-rover0,waypoint0>
```

Original plan:

; Version LPG-td-1.0

3: (sample_rock rover0 rover0store waypoint0) [1]

Destiny found: 1 [<have_soil_analysis-rover0-waypoint0,not>, <at_rock_sample-waypoint0,yes>, <at_lander-general,waypoint1>, <have_rock_analysis-rover0-waypoint0,not>, <communicated_image_data-objective1-low_res,true>, <equipped_for_soil_analysis-rover0,yes>, <at_soil_sample-waypoint0,yes>, <status-rover0store,empty>, <equipped_for_rock_analysis-rover0,yes>, <store_of-rover0store,rover0>, <visible-waypoint0-waypoint1,true>, <at-rover0,waypoint0>]

Origin found: 7 [<have_soil_analysis-rover0-waypoint0,not>, <at_rock_sample-waypoint0,not>, <at_lander-general,waypoint1>, <communicated_image_data-objective1-low_res,true>, <have_rock_analysis-rover0-waypoint0,not>, <at_soil_sample-waypoint0,yes>, <equipped_for_soil_analysis-rover0,yes>, <status-rover0store,empty>, <more_rocks-waypoint0,yes>, <equipped_for_rock_analysis-rover0,yes>, <visible-waypoint0-waypoint1,true>, <store_of-rover0store,rover0>, <at-rover0,waypoint0>]

Repaired plan (RP):

0.0:seek_rocks rover0 waypoint0

1.0:sample_rock rover0 rover0store waypoint0

2.0:drop rover0 rover0store

3.0:sample_soil rover0 rover0store waypoint0

4.0:communicate_rock_data rover0 general waypoint0 waypoint0 waypoint1

5.0:communicate_soil_data rover0 general waypoint0 waypoint0 waypoint1

Search time: 130254.0 ns

7.) TIPO DE FALLO 6 - 4: EL ROVER PIERDE LA MUESTRA QUE ACABA DE ANALIZAR.

Rovers - pfile6

SEARCH TREE=1

TIME STEP=2

WINDOW=4

DEPTH=5

b) Random failures: by exogenous events

- <status-rover1store,full> changed by <status-rover1store,empty>]

= <store_of-rover1store,rover1>

Original plan:

; Version LPG-td-1.0

2: (drop rover1 rover1store) [1]

3: (communicate_soil_data rover1 general waypoint4 waypoint4 waypoint3) [1]

EVA: No entiendo este plan ... por qué hace 'drop' antes de comunicar el soil data??

CESAR: Porque más adelante va a recoger una muestra.

Destiny found: 18 [<at_rock_sample-waypoint0,yes>, <visible_from-objective1-waypoint0,true>, <can_traverse-rover0-waypoint0-waypoint3,true>, <supports-camera1-low_res,true>, <can_traverse-rover0-waypoint0-waypoint2,true>, <have_rock_analysis-rover0-waypoint0,not>, <can_traverse-rover1-waypoint5-waypoint2,true>, <visible-waypoint2-waypoint3,true>, <can_traverse-rover0-waypoint3-waypoint0,true>, <status-rover1store,full>, <equipped_for_imaging-rover0,yes>, <visible_from-objective0-waypoint0,true>, <store_of-rover1store,rover1>, <have_rock_analysis-rover0-waypoint3,not>, <calibrated-camera1-rover0,not>, <have_rock_analysis-rover0-waypoint2,not>, <can_traverse-rover1-waypoint1-waypoint4,true>, <visible-waypoint4-waypoint3,true>, <visible-waypoint1-waypoint3,true>, <equipped_for_rock_analysis-rover0,yes>, <at_rock_sample-waypoint2,yes>, <at_rock_sample-waypoint3,yes>, <visible-waypoint0-waypoint3,true>, <supports-camera1-colour,true>, <calibration_target-camera1,objective1>, <equipped_for_soil_analysis-rover1,yes>, <have_soil_analysis-rover1-waypoint2,not>, <on_board-camera1,rover0>, <have_soil_analysis-rover1-waypoint5,not>, <have_soil_analysis-rover1-waypoint4,yes>, <at-rover1,waypoint4>, <have_soil_analysis-

rover1-waypoint1,not>, <at-rover0,waypoint0>, <have_image-rover0-objective1-low_res,not>, <can_traverse-rover1-waypoint4-waypoint1,true>, <at_soil_sample-waypoint5,yes>, <at_lander-general,waypoint3>, <have_image-rover0-objective0-low_res,not>, <status-rover0store,empty>, <can_traverse-rover1-waypoint4-waypoint5,true>, <at_soil_sample-waypoint1,yes>, <at_soil_sample-waypoint2,yes>, <store_of-rover0store,rover0>, <visible-waypoint5-waypoint3,true>, <have_image-rover0-objective0-colour,not>]

Origin found: 936:154 [<visible_from-objective1-waypoint0,true>, <at_rock_sample-waypoint0,yes>, <can_traverse-rover0-waypoint0-waypoint3,true>, <supports-camera1-low_res,true>, <can_traverse-rover0-waypoint0-waypoint2,true>, <have_rock_analysis-rover0-waypoint0,not>, <can_traverse-rover0-waypoint3-waypoint0,true>, <visible-waypoint2-waypoint3,true>, <can_traverse-rover1-waypoint5-waypoint2,true>, <status-rover1store,empty>, <visible_from-objective0-waypoint0,true>, <equipped_for_imaging-rover0,yes>, <store_of-rover1store,rover1>, <have_rock_analysis-rover0-waypoint3,not>, <calibrated-camera1-rover0,not>, <have_rock_analysis-rover0-waypoint2,not>, <can_traverse-rover1-waypoint1-waypoint4,true>, <visible-waypoint4-waypoint3,true>, <visible-waypoint1-waypoint3,true>, <equipped_for_rock_analysis-rover0,yes>, <at_rock_sample-waypoint2,yes>, <at_rock_sample-waypoint3,yes>, <visible-waypoint0-waypoint3,true>, <supports-camera1-colour,true>, <calibration_target-camera1,objective1>, <can_traverse-rover1-waypoint3-waypoint4,true>, <equipped_for_soil_analysis-rover1,yes>, <have_soil_analysis-rover1-waypoint3,not>, <on_board-camera1,rover0>, <have_soil_analysis-rover1-waypoint2,not>, <have_soil_analysis-rover1-waypoint5,not>, <have_soil_analysis-rover1-waypoint4,yes>, <at-rover1,waypoint4>, <have_soil_analysis-rover1-waypoint1,not>, <have_image-rover0-objective1-low_res,not>, <at-rover0,waypoint0>, <can_traverse-rover1-waypoint4-waypoint3,true>, <at_soil_sample-waypoint3,yes>, <at_lander-general,waypoint3>, <at_soil_sample-waypoint5,yes>, <can_traverse-rover1-waypoint4-waypoint1,true>, <have_image-rover0-objective0-low_res,not>, <at_soil_sample-waypoint1,yes>, <can_traverse-rover1-waypoint4-waypoint5,true>, <status-rover0store,empty>, <at_soil_sample-waypoint2,yes>, <visible-waypoint5-waypoint3,true>, <store_of-rover0store,rover0>, <have_image-rover0-objective0-colour,not>]

Repaired plan (RP):

0.0:navigate rover1 waypoint4 waypoint3
1.0:sample_soil rover1 rover1store waypoint3
2.0:navigate rover1 waypoint3 waypoint4
3.0:communicate_soil_data rover1 general waypoint4 waypoint4 waypoint3
4.0:drop rover1 rover1store
5.0:calibrate rover0 camera1 objective1 waypoint0
6.0:take_image rover0 waypoint0 objective1 camera1 low_res
7.0:calibrate rover0 camera1 objective1 waypoint0
8.0:communicate_image_data rover0 general objective1 low_res waypoint0 waypoint3
9.0:sample_rock rover0 rover0store waypoint0
10.0:communicate_rock_data rover0 general waypoint0 waypoint0 waypoint3
11.0:drop rover0 rover0store
12.0:take_image rover0 waypoint0 objective0 camera1 colour
13.0:communicate_image_data rover0 general objective0 colour waypoint0 waypoint3
14.0:calibrate rover0 camera1 objective1 waypoint0
15.0:take_image rover0 waypoint0 objective0 camera1 low_res
16.0:communicate_image_data rover0 general objective0 low_res waypoint0 waypoint3
17.0:navigate rover1 waypoint4 waypoint1
18.0:sample_soil rover1 rover1store waypoint1
19.0:communicate_soil_data rover1 general waypoint1 waypoint1 waypoint3
20.0:navigate rover1 waypoint1 waypoint4
21.0:navigate rover1 waypoint4 waypoint5
22.0:drop rover1 rover1store
23.0:sample_soil rover1 rover1store waypoint5
24.0:communicate_soil_data rover1 general waypoint5 waypoint5 waypoint3
25.0:navigate rover1 waypoint5 waypoint2
26.0:drop rover1 rover1store
27.0:sample_soil rover1 rover1store waypoint2
28.0:communicate_soil_data rover1 general waypoint2 waypoint2 waypoint3
29.0:navigate rover0 waypoint0 waypoint3
30.0:sample_rock rover0 rover0store waypoint3
31.0:navigate rover0 waypoint3 waypoint0
32.0:navigate rover0 waypoint0 waypoint2
33.0:communicate_rock_data rover0 general waypoint3 waypoint2 waypoint3
34.0:drop rover0 rover0store
35.0:sample_rock rover0 rover0store waypoint2
36.0:communicate_rock_data rover0 general waypoint2 waypoint2 waypoint3

Search time: 2360356.0 ns

8.) TIPO DE FALLO 7-4: EL LANDER NO ES VISIBLE DESDE EL WAYPOINT4.

Rovers - pfile6
SEARCH TREE=1
TIME STEP=3
WINDOW=4
DEPTH=5

b) Random failures: by exogenous events

- <visible-waypoint4-waypoint3,true> changed by <visible-waypoint4-waypoint3,false>]
= <have_soil_analysis-rover1-waypoint4,yes>
= <at-rover1,waypoint4>
= <at_lander-general,waypoint3>

Original plan:

; Version LPG-td-1.0

3: (communicate_soil_data rover1 general waypoint4 waypoint4 waypoint3) [1]

Destiny found: 3 [<visible_from-objective1-waypoint0,true>, <at_rock_sample-waypoint0,yes>, <can_traverse-rover0-waypoint0-waypoint3,true>, <supports-camera1-low_res,true>, <can_traverse-rover0-waypoint0-waypoint2,true>, <have_rock_analysis-rover0-waypoint0,not>, <can_traverse-rover0-waypoint3-waypoint0,true>, <visible-waypoint2-waypoint3,true>, <can_traverse-rover1-waypoint5-waypoint2,true>, <status-rover1store,empty>, <equipped_for_imaging-rover0,yes>, <visible_from-objective0-waypoint0,true>, <store_of-rover1store,rover1>, <have_rock_analysis-rover0-waypoint3,not>, <calibrated-camera1-rover0,not>, <have_rock_analysis-rover0-waypoint2,not>, <can_traverse-rover1-waypoint1-waypoint4,true>, <visible-waypoint4-waypoint3,true>, <visible-waypoint1-waypoint3,true>, <equipped_for_rock_analysis-rover0,yes>, <at_rock_sample-waypoint2,yes>, <at_rock_sample-waypoint3,yes>, <visible-waypoint0-waypoint3,true>, <supports-camera1-colour,true>, <calibration_target-camera1,objective1>, <equipped_for_soil_analysis-rover1,yes>, <on_board-camera1,rover0>, <have_soil_analysis-rover1-waypoint2,not>, <have_soil_analysis-rover1-waypoint5,not>, <have_soil_analysis-rover1-waypoint4,yes>, <at-rover1,waypoint4>, <have_soil_analysis-rover1-waypoint1,not>, <have_image-rover0-objective1-low_res,not>, <at-rover0,waypoint0>, <at_lander-general,waypoint3>, <at_soil_sample-waypoint5,yes>, <can_traverse-rover1-waypoint4-waypoint1,true>, <have_image-rover0-objective0-low_res,not>, <at_soil_sample-waypoint1,yes>, <can_traverse-rover1-waypoint4-waypoint5,true>, <status-rover0store,empty>, <at_soil_sample-waypoint2,yes>, <visible-waypoint5-waypoint3,true>, <store_of-rover0store,rover0>, <have_image-rover0-objective0-colour,not>]

Origin found: 154 [<visible_from-objective1-waypoint0,true>, <at_rock_sample-waypoint0,yes>, <can_traverse-rover0-waypoint0-waypoint3,true>, <supports-camera1-low_res,true>, <can_traverse-rover0-waypoint0-waypoint2,true>, <have_rock_analysis-rover0-waypoint0,not>, <can_traverse-rover0-waypoint3-waypoint0,true>, <visible-waypoint2-waypoint3,true>, <can_traverse-rover1-waypoint5-waypoint2,true>, <status-rover1store,empty>, <visible_from-objective0-waypoint0,true>, <equipped_for_imaging-rover0,yes>, <store_of-rover1store,rover1>, <have_rock_analysis-rover0-waypoint3,not>, <calibrated-camera1-rover0,not>, <have_rock_analysis-rover0-waypoint2,not>, <can_traverse-rover1-waypoint1-waypoint4,true>, <visible-waypoint1-waypoint3,true>, <equipped_for_rock_analysis-rover0,yes>, <at_rock_sample-waypoint2,yes>, <at_rock_sample-waypoint3,yes>, <visible-waypoint0-waypoint3,true>, <supports-camera1-colour,true>, <calibration_target-camera1,objective1>, <equipped_for_soil_analysis-rover1,yes>, <on_board-camera1,rover0>, <have_soil_analysis-rover1-waypoint2,not>, <have_soil_analysis-rover1-waypoint5,not>, <have_soil_analysis-rover1-waypoint4,yes>, <at-rover1,waypoint4>, <have_soil_analysis-rover1-waypoint1,not>, <have_image-rover0-objective1-low_res,not>, <at-rover0,waypoint0>, <at_lander-general,waypoint3>, <at_soil_sample-waypoint5,yes>, <can_traverse-rover1-waypoint4-waypoint1,true>, <have_image-rover0-objective0-low_res,not>, <at_soil_sample-waypoint1,yes>, <can_traverse-rover1-waypoint4-waypoint5,true>, <status-rover0store,empty>, <at_soil_sample-waypoint2,yes>, <visible-waypoint5-waypoint3,true>, <store_of-rover0store,rover0>, <have_image-rover0-objective0-colour,not>]

Repaired plan (RP):

0.0:navigate rover1 waypoint4 waypoint1
1.0:communicate_soil_data rover1 general waypoint4 waypoint1 waypoint3
2.0:navigate rover1 waypoint1 waypoint4
3.0:calibrate rover0 camera1 objective1 waypoint0
4.0:take_image rover0 waypoint0 objective1 camera1 low_res
5.0:calibrate rover0 camera1 objective1 waypoint0
6.0:communicate_image_data rover0 general objective1 low_res waypoint0 waypoint3
7.0:sample_rock rover0 rover0store waypoint0
8.0:communicate_rock_data rover0 general waypoint0 waypoint0 waypoint3
9.0:drop rover0 rover0store
10.0:take_image rover0 waypoint0 objective0 camera1 colour
11.0:communicate_image_data rover0 general objective0 colour waypoint0 waypoint3
12.0:calibrate rover0 camera1 objective1 waypoint0

13.0:take_image rover0 waypoint0 objective0 camera1 low_res
14.0:communicate_image_data rover0 general objective0 low_res waypoint0 waypoint3
15.0:navigate rover1 waypoint4 waypoint1
16.0:sample_soil rover1 rover1store waypoint1
17.0:communicate_soil_data rover1 general waypoint1 waypoint1 waypoint3
18.0:navigate rover1 waypoint1 waypoint4
19.0:navigate rover1 waypoint4 waypoint5
20.0:drop rover1 rover1store
21.0:sample_soil rover1 rover1store waypoint5
22.0:communicate_soil_data rover1 general waypoint5 waypoint5 waypoint3
23.0:navigate rover1 waypoint5 waypoint2
24.0:drop rover1 rover1store
25.0:sample_soil rover1 rover1store waypoint2
26.0:communicate_soil_data rover1 general waypoint2 waypoint2 waypoint3
27.0:navigate rover0 waypoint0 waypoint3
28.0:sample_rock rover0 rover0store waypoint3
29.0:navigate rover0 waypoint3 waypoint0
30.0:navigate rover0 waypoint0 waypoint2
31.0:communicate_rock_data rover0 general waypoint3 waypoint2 waypoint3
32.0:drop rover0 rover0store
33.0:sample_rock rover0 rover0store waypoint2
34.0:communicate_rock_data rover0 general waypoint2 waypoint2 waypoint3

Search time: 8790153.0 ns