Evaluation of Performance based on the Posegraph in g2o format

- Please run the file **test_graph_performance_with_g2o_dataset_A** before this file!
- Make sure that the inital working directory is **"./sobot_rimulator/script"**

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import os
os.chdir('../')  # set the working directory as "./sobot_rimulator"
os.getcwd()
```

Out[1]:
```
'/home/yixing/code/project_work/sobot-rimulator'
```

Analysis of Time Cost

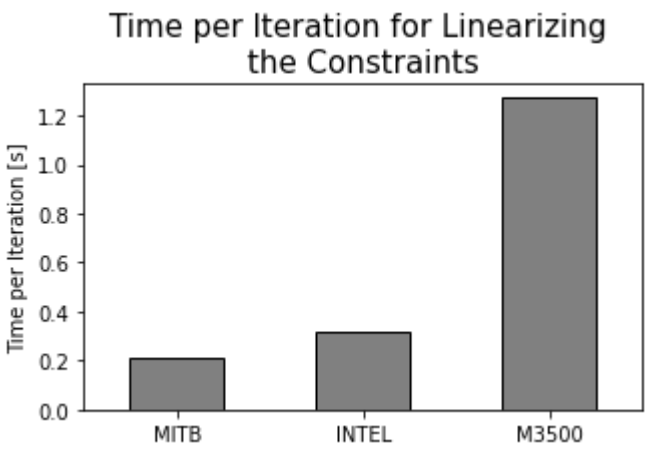
In [2]:
```
solver = "Cholesky"  #  cholesky or spsolve
df = pd.read_csv("./scripts/result/time_cost_g2o_{0}.csv".format(solver.lower()))
df["log_global_error"] = np.log(df["global_error"])
df.head(15)
```

Out[2]:

	name	iteration	linearization_time_cost	solve_time_cost	global_error	solver	log_global_error
0	INTEL	0	0.000000	0.000000	5.149721e+06	cholesky	15.454453
1	INTEL	1	0.305283	0.001590	1.511636e+08	cholesky	18.833873
2	INTEL	2	0.329507	0.001656	5.143087e+06	cholesky	15.453164
3	INTEL	3	0.364126	0.002427	3.266647e+04	cholesky	10.394104
4	INTEL	4	0.341682	0.001556	2.158643e+02	cholesky	5.374650
5	INTEL	5	0.289461	0.003079	2.158333e+02	cholesky	5.374506
6	INTEL	6	0.307643	0.001626	2.158333e+02	cholesky	5.374506
7	INTEL	7	0.272456	0.001597	2.158334e+02	cholesky	5.374507
8	INTEL	8	0.317468	0.001605	2.158335e+02	cholesky	5.374507
9	INTEL	9	0.265859	0.001582	2.158333e+02	cholesky	5.374507
10	INTEL	10	0.372645	0.001567	2.158333e+02	cholesky	5.374507
11	MITB	0	0.000000	0.000000	4.414182e+09	cholesky	22.208088
12	MITB	1	0.568163	0.000916	1.940530e+10	cholesky	23.688812
13	MITB	2	0.276594	0.001060	4.232531e+08	cholesky	19.863481
14	MITB	3	0.190530	0.001484	6.183813e+07	cholesky	17.940031

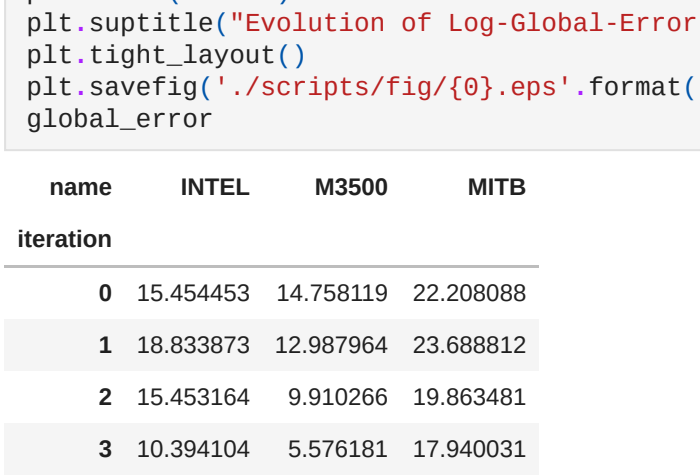
In [3]:
```
linear_time = df.pivot(index = "iteration", columns = "name",
            values="linearization_time_cost")
linear_time = linear_time[linear_time.index != 0]
linear_time = linear_time[["MITB", "INTEL", "M3500"]]
linear_time = linear_time.mean()
# colors=['black', 'dimgray','darkgray']
linear_time.plot(kind = "bar", rot = 0, color = "gray", edgecolor="k", figsize=(5,3))
plt.xlabel("")
plt.ylabel("Time per Iteration [s]")
plt.title("Time per Iteration for Linearizing \nthe Constraints", size = 15)
#plt.legend(loc='upper left', bbox_to_anchor=(1.0, 0.5),
#          fancybox=True, shadow=True)
plt.savefig('./scripts/fig/{0}.eps'.format("Time_per_Iteration_for_Linearizing_the_Constraints"),
            format='eps', bbox_inches='tight')
linear_time
```

Out[3]:
```
name
MITB     0.214191
INTEL    0.316613
M3500    1.270573
dtype: float64
```



In [4]:
```
solve_time = df.pivot(index = "iteration", columns = "name", values="solve_time_cost")
solve_time = solve_time[solve_time.index != 0]
solve_time = solve_time[["MITB", "INTEL", "M3500"]]
solve_time = solve_time.mean()
# colors=['black', 'dimgray','darkgray']
solve_time.plot(kind = "bar", rot = 0, color = "gray", edgecolor="k", figsize=(5,3))
plt.xlabel("")
plt.ylabel("Time per Iteration [s]")
#plt.legend(loc='upper left', bbox_to_anchor=(1.0, 0.5),
#          fancybox=True, shadow=True)
plt.title("Time per Iteration for Solving \nthe Sparse Linear System by {0}".format(solver), size = 15)
plt.savefig('./scripts/fig/{0}.eps'.format("Time_per_Iteration_for_Solving_the_Sparse_Linear_System"),
            format='eps', bbox_inches='tight')
solve_time
```

Out[4]:
```
name
MITB     0.000969
INTEL    0.001828
M3500    0.010817
dtype: float64
```

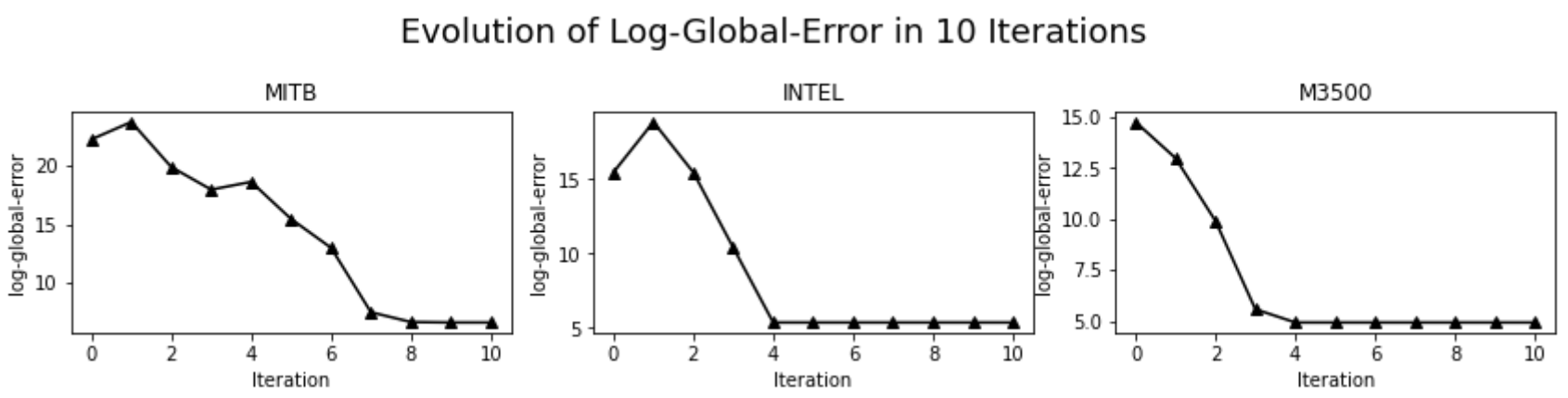


Evaluation of Convergency

In [5]:
```
global_error = df.pivot(index = "iteration", columns = "name", values="log_global_error")

plt.subplot(1,3,2)
global_error["INTEL"].plot(color = "k", marker = "^", rot = 0, figsize=(12,3))
plt.xlabel("Iteration")
plt.ylabel("log-global-error")
plt.title("INTEL")

plt.subplot(1,3,3)
global_error["M3500"].plot(color = "k", marker = "^", rot = 0)
plt.xlabel("Iteration")
plt.ylabel("log-global-error")
plt.title("M3500")

plt.subplot(1,3,1)
global_error["MITB"].plot(color = "k", marker = "^", rot = 0)
plt.xlabel("Iteration")
plt.ylabel("log-global-error")
plt.title("MITB")
plt.suptitle("Evolution of Log-Global-Error in 10 Iterations", size = 18)
plt.tight_layout()
plt.savefig('./scripts/fig/{0}.eps'.format("Evolution_of_Global_Error"), format='eps')
global_error
```

Out[5]:

name	INTEL	M3500	MITB
iteration			
0	15.454453	14.758119	22.208088
1	18.833873	12.987964	23.688812
2	15.453164	9.910266	19.863481
3	10.394104	5.576181	17.940031
4	5.374650	4.926852	18.599890
5	5.374506	4.926623	15.444616
6	5.374506	4.926623	12.998432
7	5.374507	4.926623	7.518804
8	5.374507	4.926623	6.688553
9	5.374507	4.926623	6.649879
10	5.374507	4.926623	6.648735



In [ ]: