

## Parallel Session 7 – Safety & Security



# Utilization Safe Zone for Emergency Evacuation of Passengers



**UIC next station**  
TEHRAN 2019

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# INTRODUCTION

station characteristics such as :

- high passenger flow
- long evacuation paths



# INTRODUCTION



London - Station -1987

31 died - seriously injured many more



UIC next station  
TEHRAN 2019



India – Historical Building- 2004  
42 people died and injured many

# INTRODUCTION

Country/year	Diaster	Died/Injured
Azerbaijan - 1995	Fire at the station	289 died 265 injured
Philippines – 1996	Fire at the club	more than 150 people died
South Korea – 1999	Fire at the shopping complex	54 died 71 injured
China - 2000	Fire at commercial building	309 died
South Korea - 2003	Fire at the station	189 died 146 injured
Thailand - 2009	Fire at the club	50 died 200 injured
Brazil - 2013	Fire at the club	200 died
India - 2013	A stampede at a railway station	36 died 31 injured
United state - 2015	Fire at the station	1 died 91 injured
Taiwan - 2015	explosion at the Water Park	500 injured

# Idea

## Safe zone



➤ What is safe zone?

- passengers wait in the area for a certain period
- provides enough protection

➤ Where is safe zone?

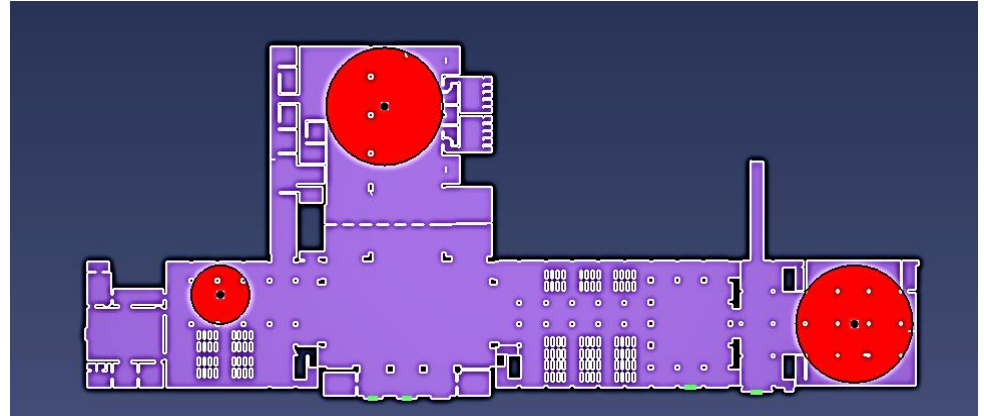
- safe structure
- general ground



# Idea

## Safe zone

1. Selection of these points
2. the passengers waiting time
3. the exiting priority



# Methodology

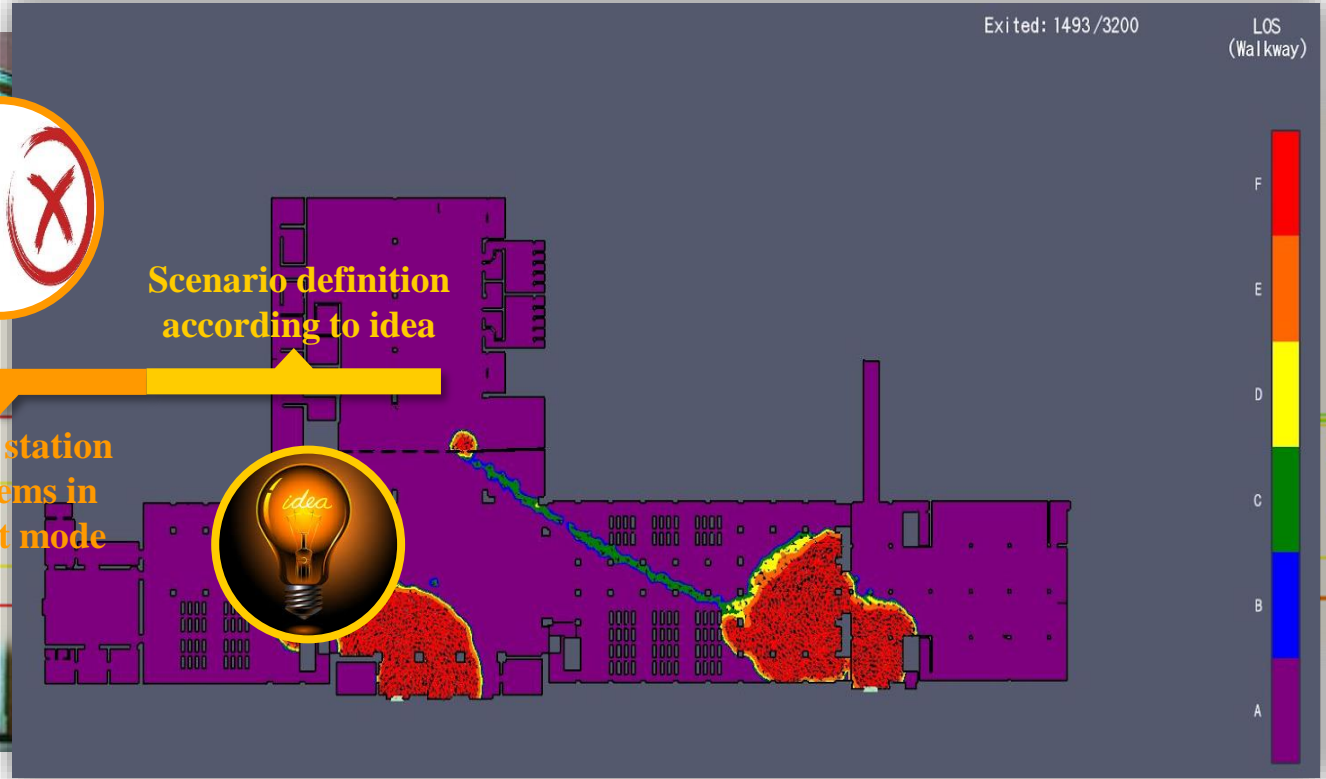


Simulation in **AI**  
current situation

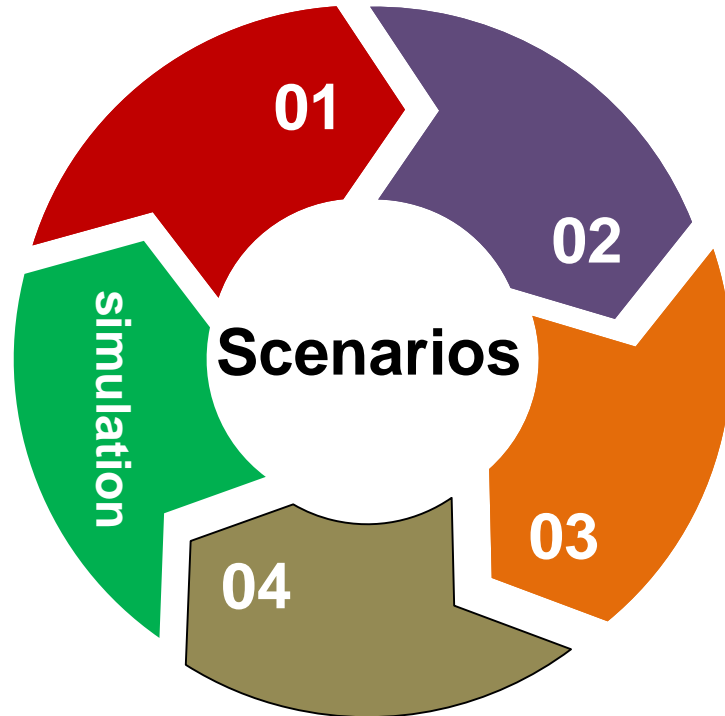


Scenario definition  
according to idea

Check station  
problems in  
current mode



# Methodology



**baseline scenario**



**based on prioritizing exit**



**based on safe zone**

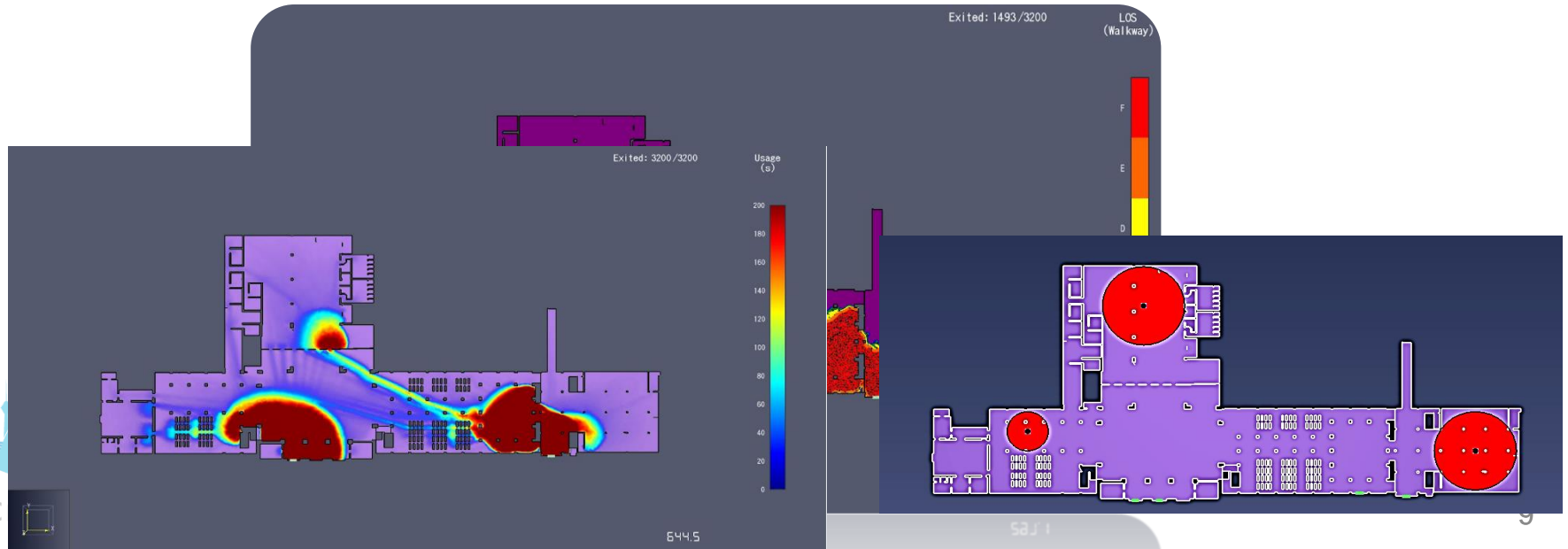


**combining 2nd with  
the best of 3rd**



# RESULTS

Number of evacuated people in the second stage	Number of evacuated people in the first stage	Evacuation time of the second stage	Evacuation time of the first stage	Scenario definition	Scenario number
0	3200	0	10:44	Current state	A

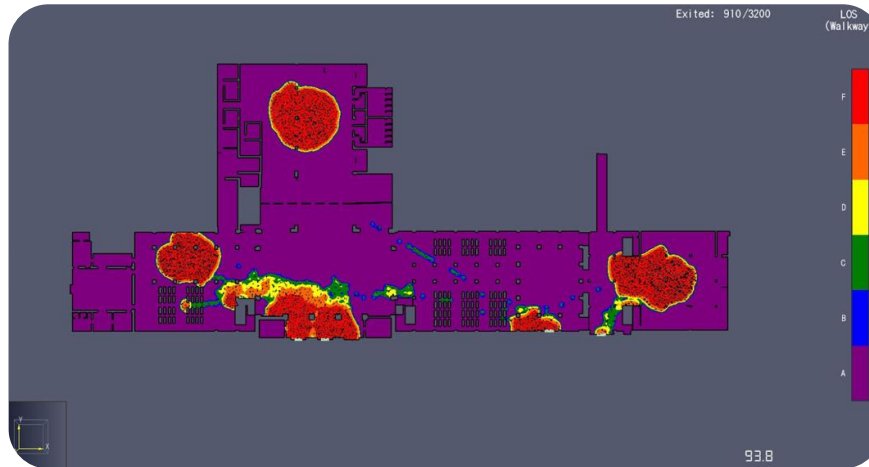


# RESULTS

Number of evacuated people in the second stage	Number of evacuated people in the first stage	Evacuation time of the second stage	Evacuation time of the first stage	Scenario definition		Scenario number
1600	3000	3:13	18:55	Only	exit priorities	B
1600	1600	5:00	7:40	C2	Only the safe zones are considered	C
2300	900	5:40	7:04	C3		
2000	1200	4:35	7:50	C4		
1600	1600	5:50	5:40	C5		

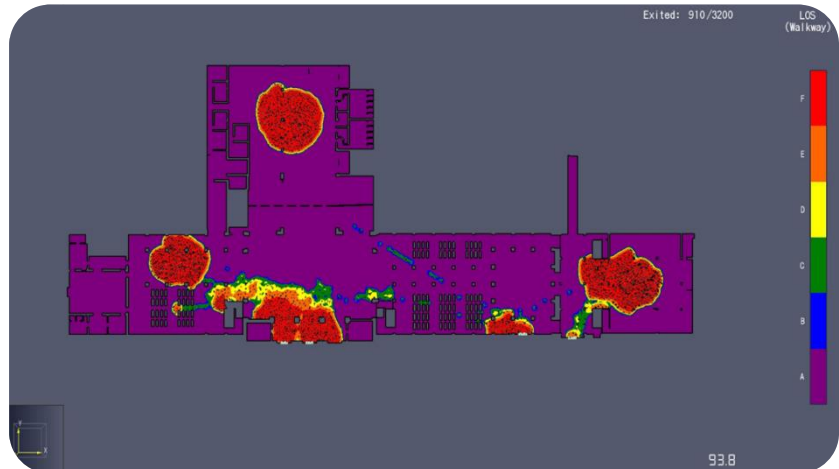
# RESULTS

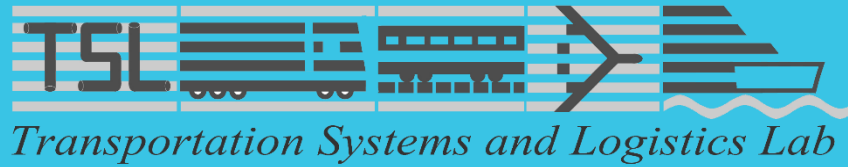
Number of evacuated people in the second stage	Number of evacuated people in the first stage	Evacuation time of the second stage	Evacuation time of the first stage	Scenario definition		Scenario number
1600	1600	7:01	6:04	D1	C5 + B	D
1600	1600	5:23	5:30	D2		
1600	1600	4:56	6:15	D3		
1600	1600	4:47	5:20	D4		



# DISCUSSION

- ❖ Best scenario
- ❖ Giving priority alone cannot shorten the exit time
- ❖ Reduce the amount of damage to passengers.





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**Thank you**  
for your kind attention

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