

A decorative graphic on the left side of the slide consisting of two overlapping parallelograms. The front one is blue and the back one is light green. They are positioned diagonally, with the blue one partially covering the green one.

International Airport operations improvement and terrorism prevention

Group 4

Terrorism

Terrorism in the broadest sense is the intentional use of violence to create terror among masses of people

There are 2 major types of Terrorism defined by FBI

International Terrorism

Perpetrated by individuals and/or groups inspired by or associated with designated foreign terrorist organizations or nations (state-sponsored).

for example: The December 2, 2015 shooting in San Bernardino, CA, that killed 14 people and wounded 22 which involved a married couple who radicalized for some time prior to the attack and were inspired by multiple extremist ideologies and foreign terrorist organizations

Domestic Terrorism

Perpetrated by individuals and/or groups inspired by or associated with primarily U.S.-based movements that espouse extremist ideologies of a political, religious, social, racial, or environmental nature.

for example : The June 8, 2014 Las Vegas shooting, during which two police officers inside a restaurant were killed in an ambush-style attack, which was committed by a married couple who held anti-government views and who intended to use the shooting to start a revolution



Background

1.Tactic: The tactic usually used in the attack is listed here:

Armed Attack	Hijacking
Set Fire	Kidnapping
Assassination	other
Barricade/Hostage	Unconventional Attack
Bombing	

2.Weapons: the weapons used is entered here:

Remote-detonated explosive	Biological Agent
Fire on Firebomb	Chemical Agent
Explosive	Radiological Agent
Firearms	
Knives and sharp objects	

Major Terrorist attacks in the airport in the past

Brussels Airport attack

A bad terrorism attack happened at Brussels Airport on March 22, 2016. Two suicide bombers implemented two continuous explosions attacks. The first explosion occurred at 7:58 and the second one occurred later 37s. Those two explosions caused 11 people died.



Major Terrorist attacks in the airport in the past

The Ataturk Airport terrorist attack

The Ataturk Airport terrorist attack, occurred on 28 June 2016 at Ataturk Airport in Istanbul is another bad terrorism attack example. This attack case consisted of shooting and suicide bombings, and caused 45 people died. There was no proper checking for cars in the place and the terrorist came by taxi and started killing everyone.



Brainstorm

The following problems were detected in the security agencies

- Doesn't screen persons passing through restricted security area
- TSA does not screen properly the restricted items through the scanner
- Airport security is predictable
- Legal issues like violation of rights of a individual and injury to a person from screening process
- Security trays not at all healthy carrying lot of germs
- No belief in people's security
- Chaotic environments like festivals and holiday seasons leads to slip by of potential threats
- Security cameras not working
- Higher officials have no idea of how the systems on ground are working
- Short staff during peak times
- The checking process is to predictable able to plan what to do in advance
- The tests can be passed easily

Brainstorm

The proposed solution for the problems could be

1. Government prepare the equipment for security inspection like the full body scanners with legal and administrative aid
2. Government prepare the equipment and people for rescue.
3. Training security guards and recruiting more people.
4. Design the inspection route to make sure passengers can pass the inspection quickly.
5. Maintenance of the equipment and periodic inspection of it .
6. Make a plan of evacuation when attack happend.
7. Rebuilding the area damaged if there is a explosion.
8. Handling dangerous items detected.
9. Equipment and technology updating like better information to be given to rescue and security teams

Brainstorm

10. Strengthen patrol .

11. Strengthen vehicle access check

12. Explosion-proof inspection at the entrance and exit of the terminal building.

13. Emergency Heal treatment like medician, bandage, stretcher to be avalaible on spot for treatement

14. The terminal entrance needs to be beefed up with security with latest equipment like CT scanners

15. Privacy invasion must be recognized

16 Improvement of security at foreign airports

17. Using of biometric systems to restrict access to certain areas

Planning to improve airport operation
and prevent terrorism

update inspection
equipment

prepare rescue
equipment and
medical staff

Training security
guards

make evacu
plan

passengers
arrival

identity
confirmation

security
check

threat
detected?

Yes

Handling
the threat

No

Yes attacks

Yes

No

evacuate people
and deal with
the attack

terrorists
among passengers?

No

end

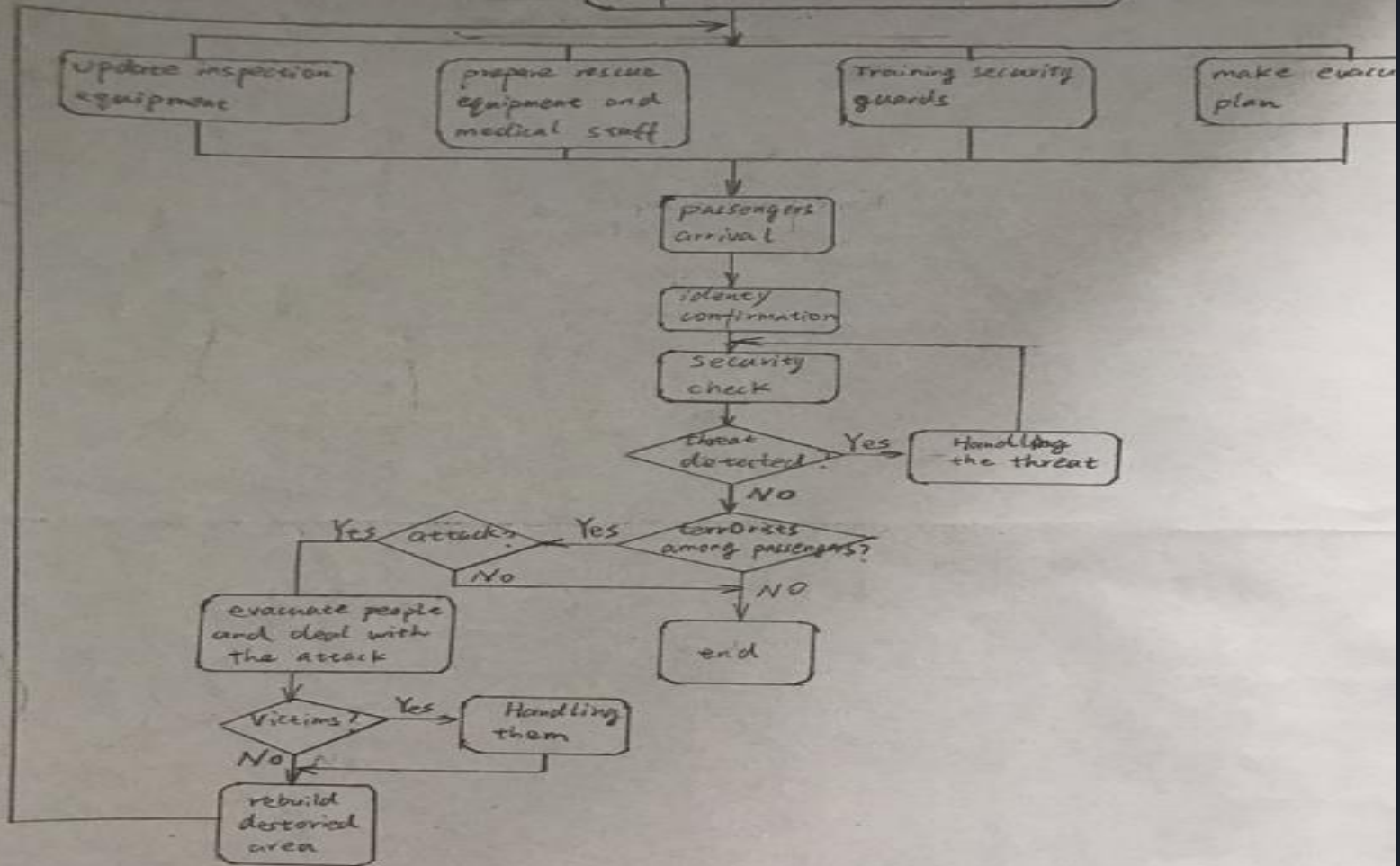
victims?

Yes

Handling
them

No

rebuild
destroyed
area



COPQ Analysis

Cost of Poor Quality				
Process	Internal Failure	External Failure	Appraisal	Prevention
Screening of passengers	Improper screening of passengers and not detecting potential threats	Terrorists and armed persons entering the premise	Better training of staff to provide the adequate safety	Using advanced technologies like artificial intelligence to scan people along with security personal
Havoc Preparedness	No training or drills given to passengers in event of a attack	Passengers not trained	Conducting drills with passengers	Imparting knowledge by community awareness programs of what to do in a even of security breach

Six sigma

What is six sigma?

The six sigma approach is a collection of managerial and statistical concepts and techniques that focus on reducing variation in process and preventing deficiencies in product.

Six sigma phases:

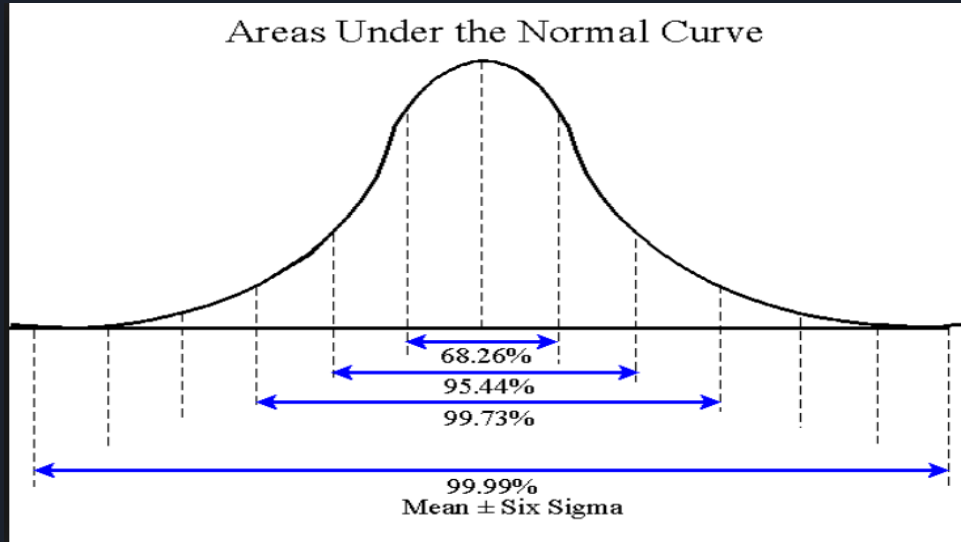
Define

Measure

Analyze

Improve

Control





Six sigma: Define phase

1. Identify potential projects.
2. Evaluate projects.
3. Select project.
4. Prepare problem and mission statement.
5. Select and launch project team.



Define phase(continue)

1. Identify potential projects:

Should focus on the vital few opportunities that will increase customer satisfaction and reduce the cost of poor quality:

- Project: Use advanced technologies like artificial intelligence to scan people at security checking point.
- This may increase customers' satisfaction since the scanning time is shorter and it may reduce COPQ.



Define phase(continue)

2. Evaluate projects:

Pareto priority index (PPI) is a useful tool to evaluate project.

$$PPI = \text{Saving} * \text{probability} / \text{Cost} * \text{time to completion.}$$

Projects	Saving by applying AI scanning technology(\$thousands)	Probability	Cost of new equipments(\$thousands)	Time(years)	PPI
A	100	0.7	10	2	3.5
B	80	0.7	15	1	3.733
C	60	0.8	25	1	1.92



Define phase(continue)

3. Selection of initial projects:

- “The first project should be a winner.”
- A successful project is a form of evidence to the project team members that the improvement process does lead to useful results.

4. Problem and mission statement for project:

A problem statement identifies a visible deficiency in a planned outcome.

- “Through the feedback of Beijing Capital International Airport in year 2017, 3% percent customers complained about airport scanning system.”
- A problem statement should never imply a cause or a solution.



Define phase(continue)

5. Select and launch the project team.

A project team consists of 6-8 persons, drawn from multiple departments and assigned to address the chronic problem selected.

Components of a project team:

- A Sponsor.
- A leader.
- A recorder.
- Team members.
- A facilitator.



Six sigma: Measure phase

1. Verify the project need.
2. Document the process.
3. Plan for data collection.
4. Measure the process capability.



Measure phase(continue)

1. Verify the project need.
 - It is useful to verify the size of the problem in numbers.
 - The time spent by the team should be justified.
 - This part helps to overcome **resistance** to accepting.

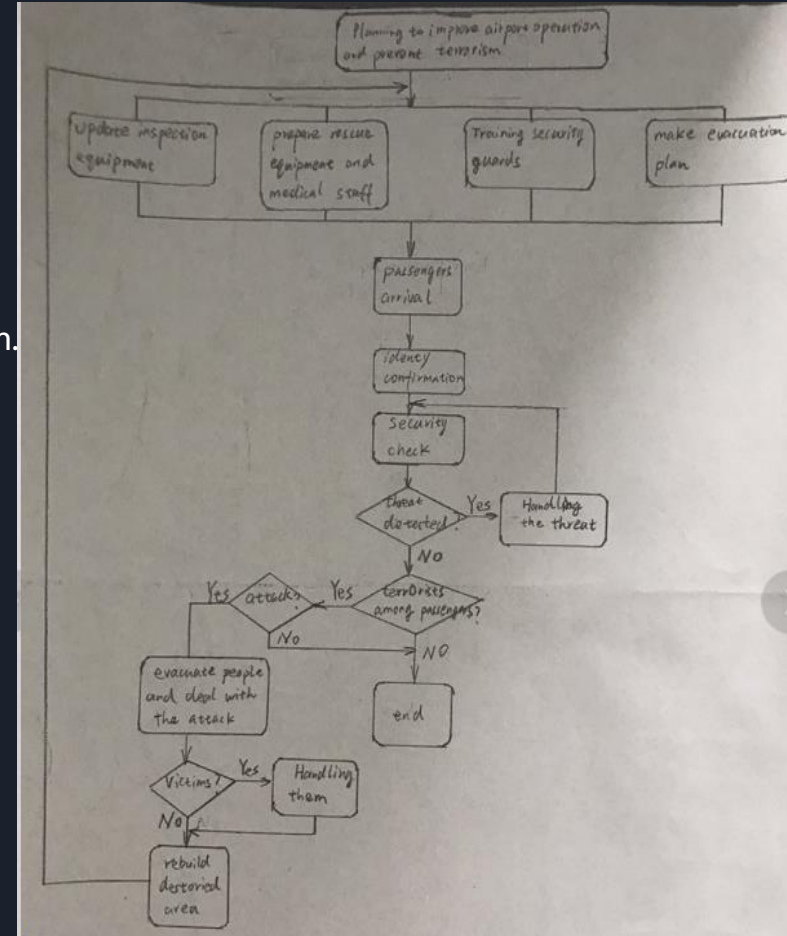
If a project of using advanced AI technologies in an airport is protested by other people, numerical data could be list and it may be a powerful weapon to show the project could give lots of benefits.

Measure phase(continue)

2. Document the process

This step records the activities under study
and information relating to actual or potential problem.

A useful tool is the process flow diagram.





Measure phase(continue)

Other information useful in documenting the process:

A defect: any nofulfillment of intended use requirements.

- In define phase, 12 new AI technology equipments should be used to cover all regions of the airport. But 2 of them have quality issues and can't be used in several months.

A symptom: an observable phenomenon arising from and accompanying a defect.

- Airport security checking regions without new equipments get bad feedback from customers.



Measure phase(continue)

3. Plan for data collection.

Chronic problems are usually not easy to solve and require careful planning and collection of data to confirm and analyze the input and output variables.

Data collection involves matters such as where in the process data will be collected , who will provide the data, whether the data are sufficient.

Some symptoms occur in this phase. But understanding symptoms could be hard in many cases since some key word or phrase has multiple meanings.

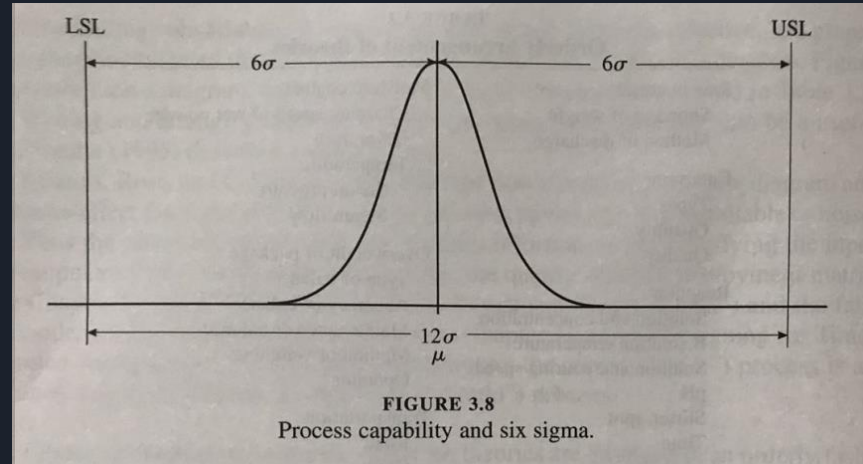
Symptoms could be quantification by some tools, for example, Pareto diagram.

Measure phase(continue)

4. Process capability

Process capability refers to the inherent ability of a process to meet the specification limits for a product.

Specification limits must be at least
six sigma above and below
the process mean.





Six Sigma:Analyze phase

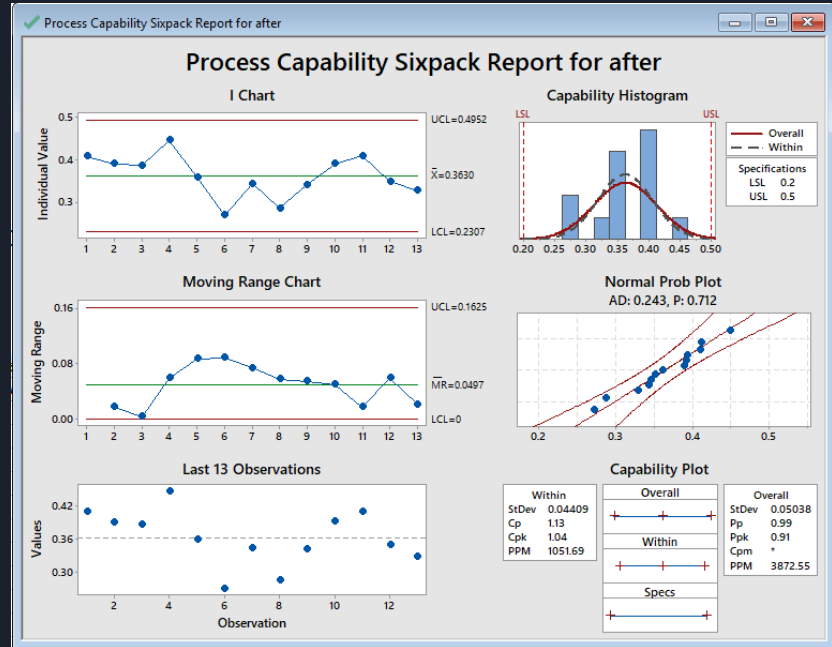
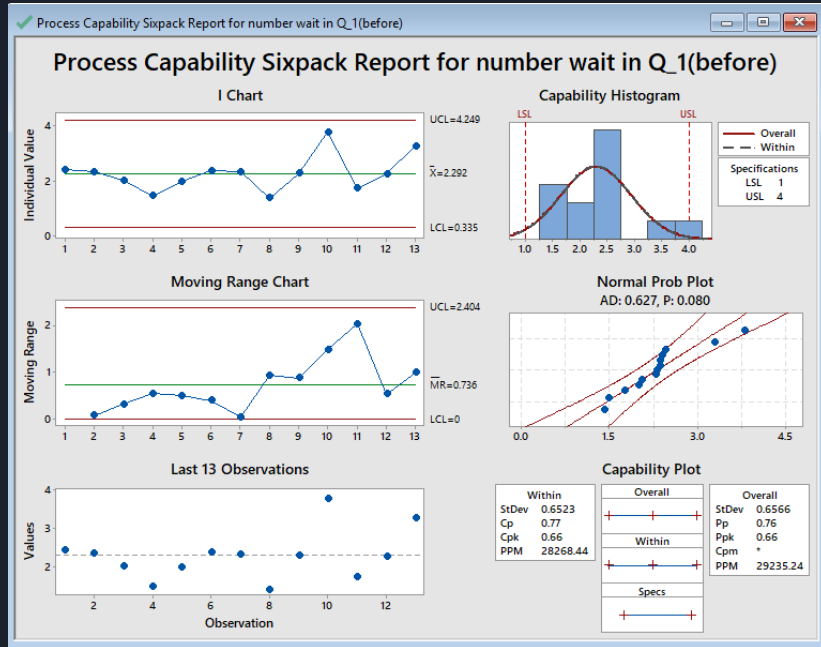
(generating random date, using Minitab)

- Process Capability analysis
- ANOVA

number wait in Q_1(before)	number wait in Q_2(after)
2.03	0.3877
1.48	0.4476
1.99	0.3598
2.39	0.2701
2.34	0.3445
1.40	0.2865
2.29	0.3416
3.79	0.3921
1.74	0.4100
2.28	0.3501
3.28	0.3280

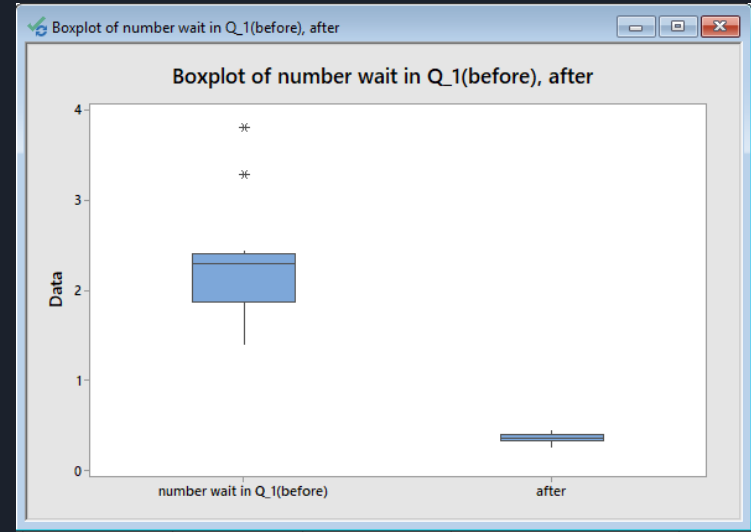
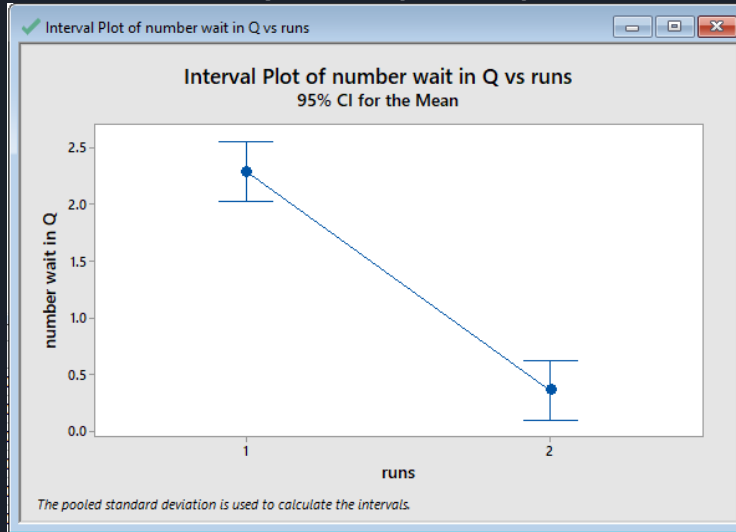
Analyze phase(continue)

Process Capability analysis



Analysis phase(continue)

Process Capability analysis



Tukey Pairwise Comparisons

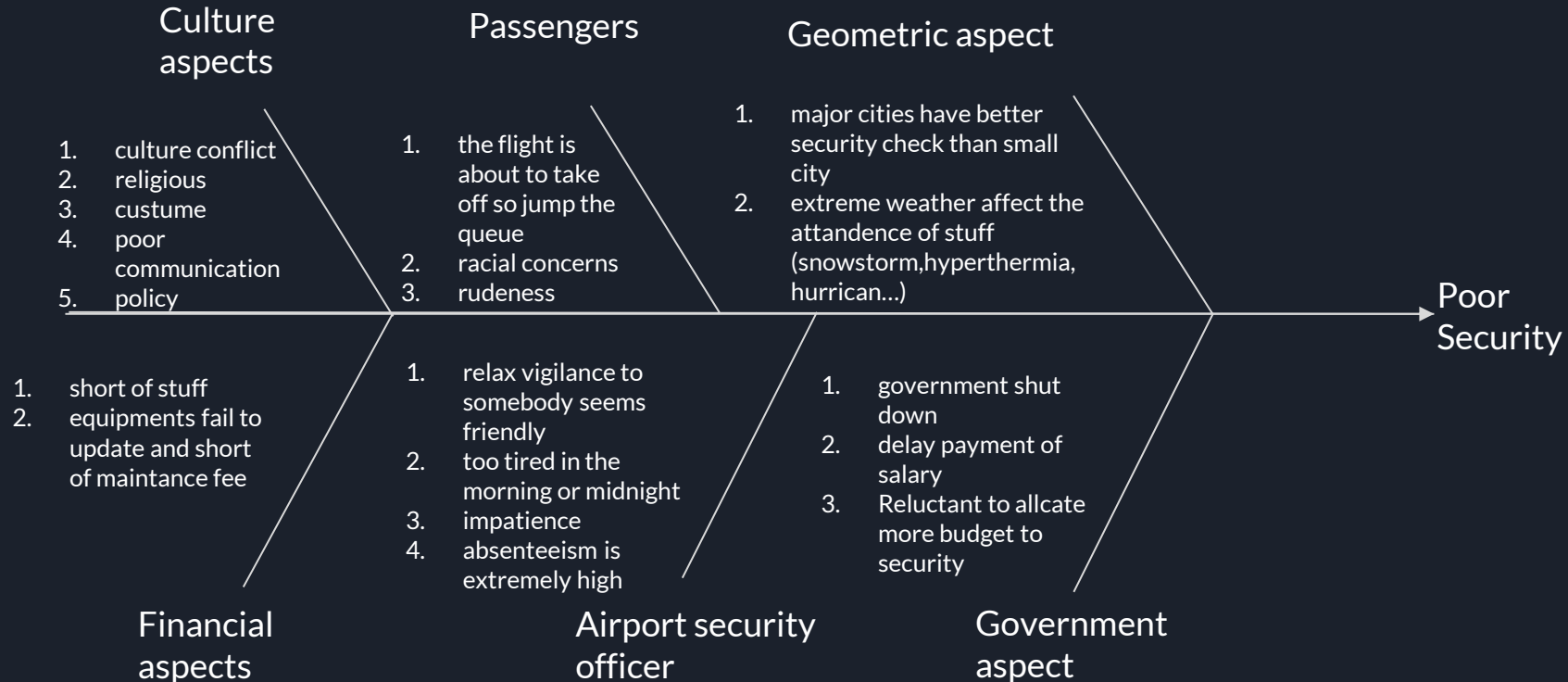
Grouping Information Using the Tukey Method and 95% Confidence

runs	N	Mean	Grouping
1	13	2.292	A
2	13	0.3630	B

Means that do not share a letter are significantly different.

Analyze phase(continue)

Fishbone Diagram





Six sigma: Improve phase

This phase designs a remedy, proves its effectiveness, and prepares an implementation plan.

1. Evaluate alternative remedies.
2. If necessary, design formal experiments to optimize process performance.
3. Design a remedy.
4. Prove the effectiveness of the remedy.
5. Deal with resistance to change.
6. Transfer the remedy.

- 
- Evaluate alternative remedies

The remedy selected should significantly improve on the original problem and should optimize both company costs and customer costs.(Tool: remedy selection matrix)

Example:

To improve the inspection efficiency. The inspection process should be faster and more accurate. The team need to list criteria and evaluate each remedy for each criterion.

Extend the inspection area and add more screening equipments.

Introduce advanced technology like artificial intelligence to help security guards.

Make standards for passenger. (Number of bags; Weight of bags; Contraband;)

- Design of experiments

If necessary, experiments can be implemented to determine and analyze the dominant causes of a quality problem and to design a remedy.

Five types of experiments: (change the dominant variable)

1.Evaluating suspected dominant variables.

2.Exploratory experiments to determine dominant variables

3.Production experiments

4.Response to surface experiments.

5.Simulation.(arena)

- 
- Design a remedy

The remedy must fulfill the original project mission, particularly with respect to meeting customer needs.

This step identifies the customers, defines their needs, and proves the effectiveness.

- Prove effectiveness of the remedy

Two steps:

1. Preliminary evaluation of the remedy under conditions that simulate the real world.

rough evaluation; never fully met; (simulate the inspection process using arena)

1. Final evaluation under real-world conditions.

Systems need to be tested under conditions they will work in the future.

(implement the experiment in a real airport)

- 
- Deal with resistance to change

Change:

- 1) a technological change.
- 2) a social consequence of the technological change.

changes may be object.

To achieve change, we must:

- 1) Be aware that we are dealing with a pattern of human habits, beliefs, and traditions that may differ from our own.
- 2) Discover the exact social effects of the proposed technological changes.

- 
- Transfer the remedy to operations

Transfer to operations may include revisions in operating standards and procedures; changes in staffing and responsibilities; additional equipment, materials, and supplies; and extensive training on the why and how of the changes.

Example:

We want to introduce advanced technology to improve the inspection efficiency. When we transfer the remedy to operations, we need to add new equipments; rearrange the inspection procedures; training staffs to make sure they can work with the new equipment and won't object the changes.



Six sigma: control phase

In this phase, we design and implement certain activities to hold the gains of improvement.

1. Design controls and document the improved process.
2. Validate the measurement system.
3. Determine the final process capability.
4. Implement and monitor the process controls

- 
- Design controls and document the improved process

In this step we provide a systematic means for holding the gains.

Control process is done through use of a feedback loop (compare the actual performance and the standard of performance)

Documentation of the improved process should include four previous steps.

- Validate the measurement system

May include new measurement devices, the collection of new data, additional training for process personnel.

- 
- Implement and monitor the improved process

Final step in a quality improvement project.

In this step, the improved process is placed into operation, and the control steps described are used to monitor process conditions and product performance. The team confirm if the remedies work depends on the measurement of COPQ.



Thank you !