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ASELSAN Türk Silahlı Kuvvetlerini Güçlendirme Vakfı'nın bir kuruluşudur.



UGES

**Transportation, Security, Energy,
Automation and Healthcare Systems**
Business Sector

AUTOMATIC TRAIN CONTROL AND SAFETY APPROACH IN CBTC PROJECTS

November 2022



RAM + S



OUTLINE

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CBTC

- WHAT IS CBTC?
- AUTONOMOUS OPERATION

SAFETY

- STRATEGY
- POLICY
- ORGANIZATION

AUTOMATIC TRAIN CONTROL

- KEY COMPONENTS
- ASELSAN APPROACH
- ATC & SAFETY RELATION

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CBTC
SYSTEM



CBTC | ASELSAN METRO SIGNALING SYSTEM

SAFETY INTEGRITY LEVEL-4 (SIL4) | INFORMATION SECURITY
ENERGY EFFICIENCY | AUTOMATIC TRAIN OPERATOR



ON BOARD ATP
ATO SYSTEM



COMMUNICATION
SYSTEM



TRAFFIC MANAGEMENT
SYSTEM



TRACKSIDE AUTOMATIC
TRAIN CONTROL SYSTEM



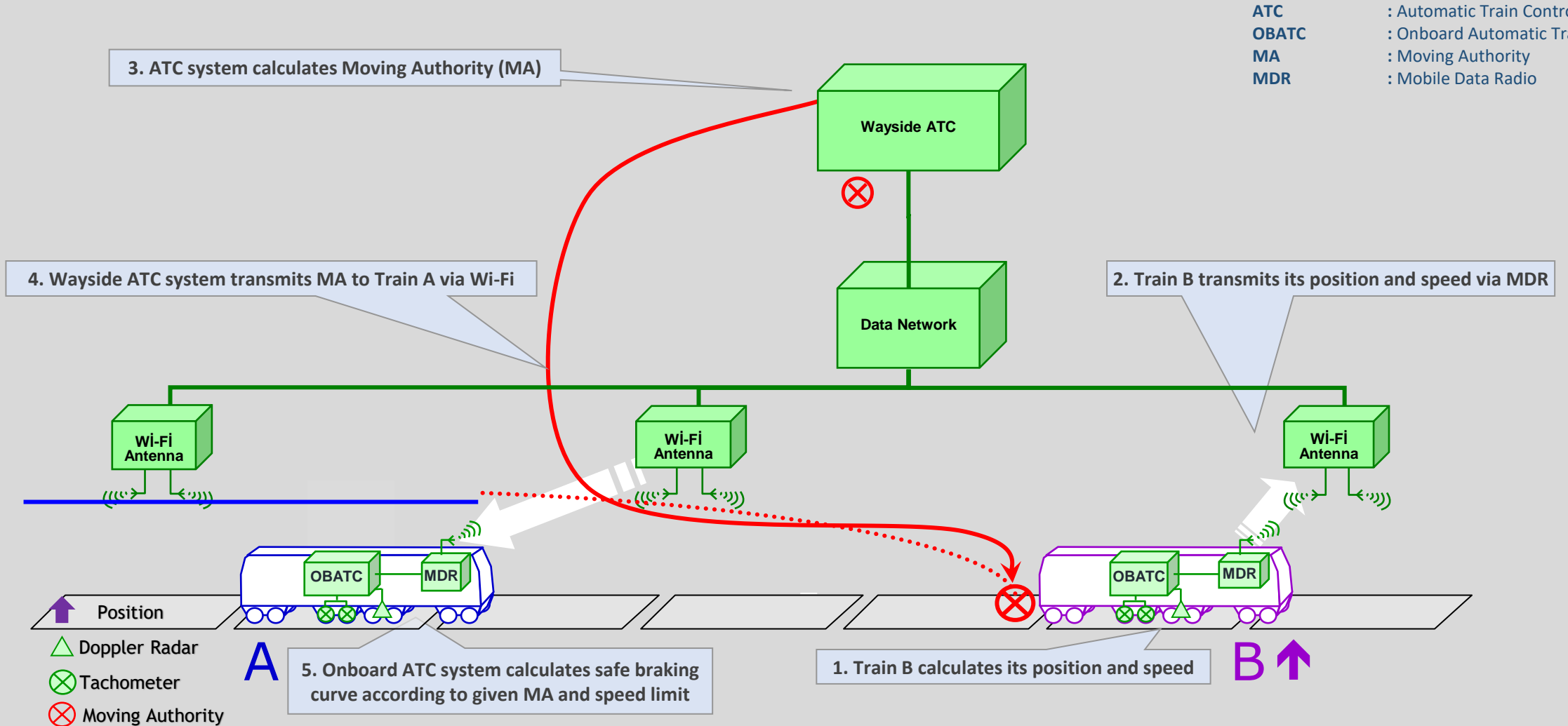
TRACKSIDE EQUIPMENT

"ASELSAN's autograph on rails"



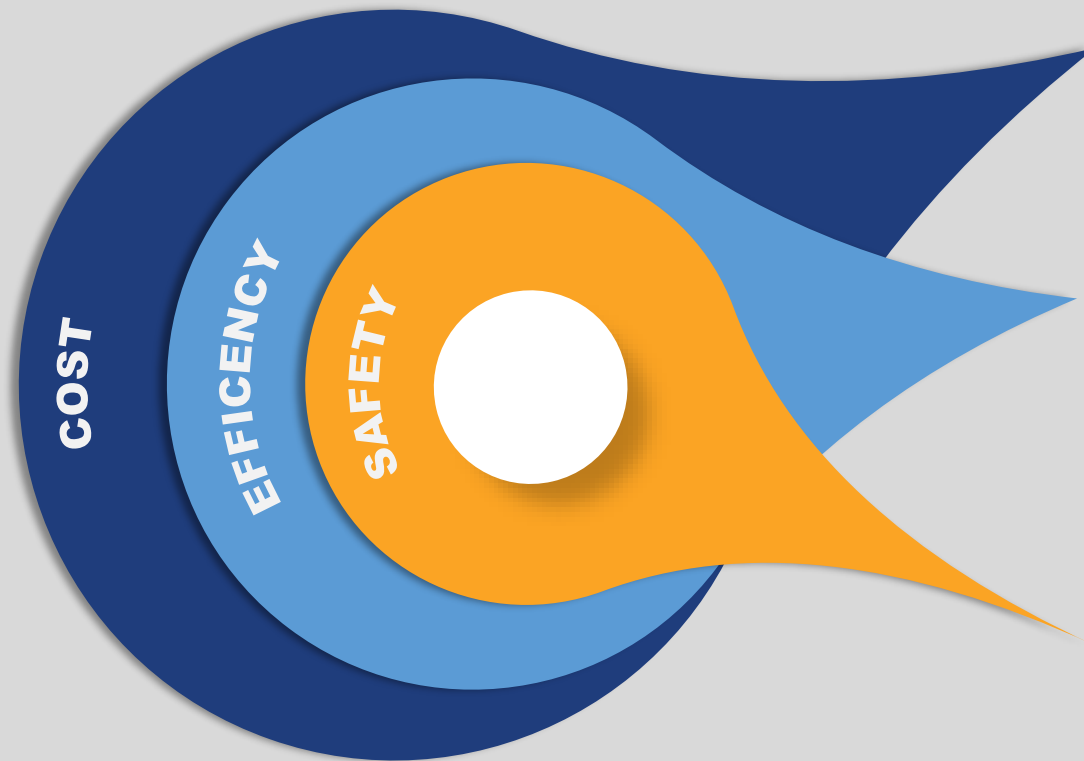
CBTC | CBTC METRO SIGNALING SYSTEM THEORY

ATC : Automatic Train Control
OBATC : Onboard Automatic Train Control
MA : Moving Authority
MDR : Mobile Data Radio





CBTC SYSTEMS | AUTONOMOUS OPERATION ADVANTAGE



COST

- Deployment
- Operation

EFFICIENCY

- Accurate Operation
- Adaptive Planning
- High Capacity
- High Punctuality

SAFETY

- Determinism
- Accuracy
- Low Error Rate
- Progressive Improvement

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SAFETY

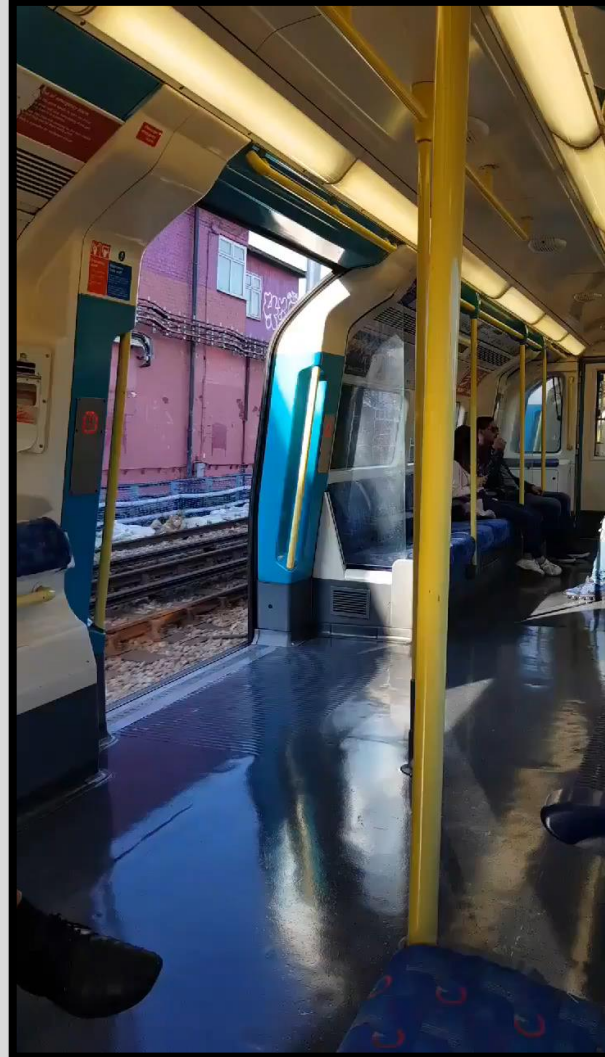


SAFETY | SAFETY FIRST





SAFETY | SAFETY FIRST



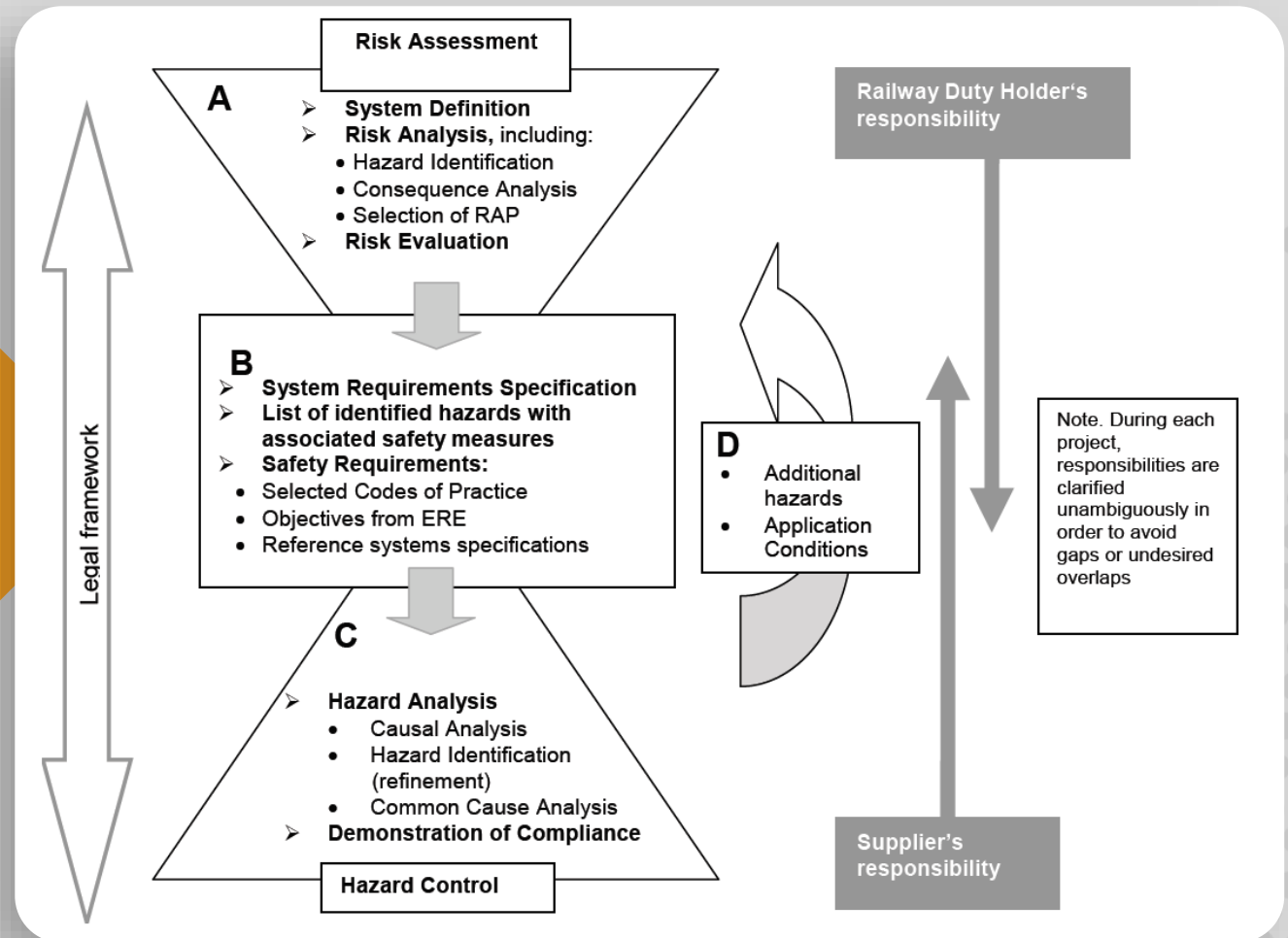


SAFETY | STRATEGY

Safety always comes first!

All staff are responsible for the achievement

THE HOURGLASS MODEL (EN50129)





SAFETY | POLICY

Conformity with the requirements of CENELEC EN50126-50128-50129-50159 standards

- Build a common safety culture between project stakeholders
- RAMS Team Regular Meetings
- Safety Reviews
- Emphasize Safety in each Project meetings
- Project Partners and Sub-contractors informed and audited if necessary

Prevent fatalities and serious injuries

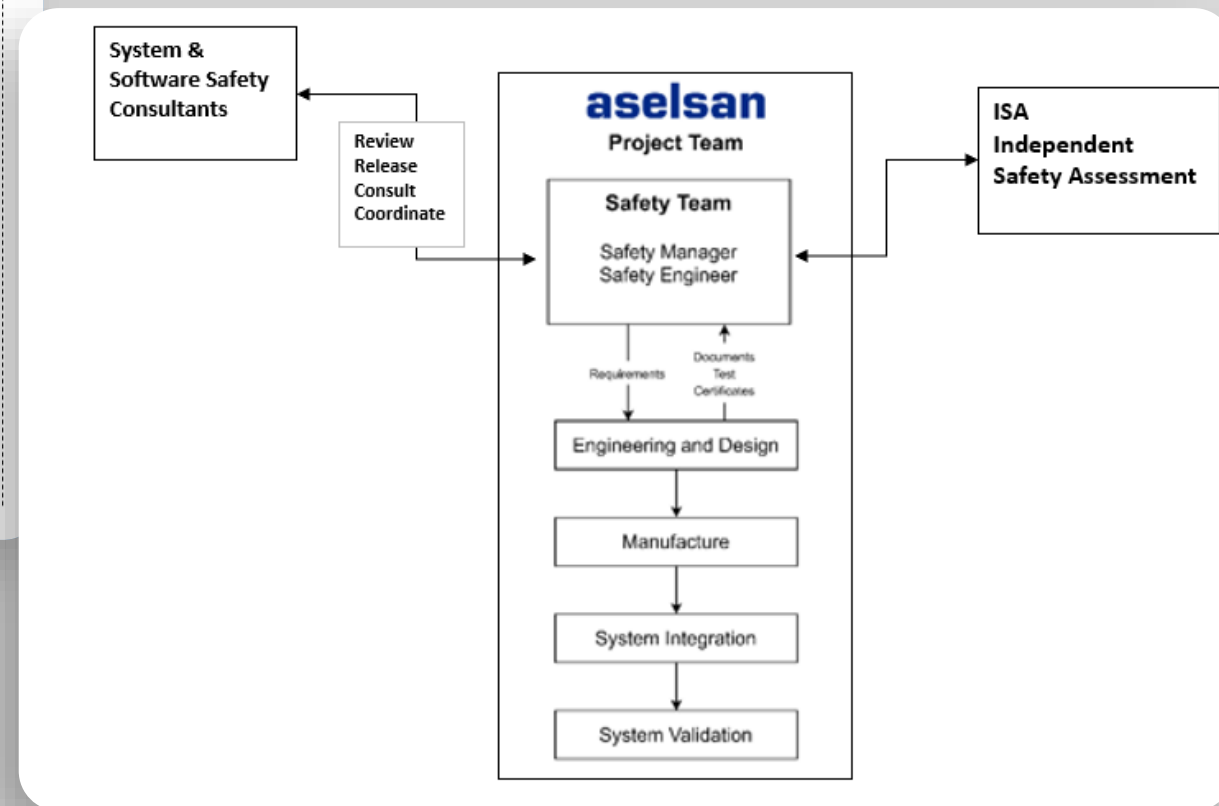
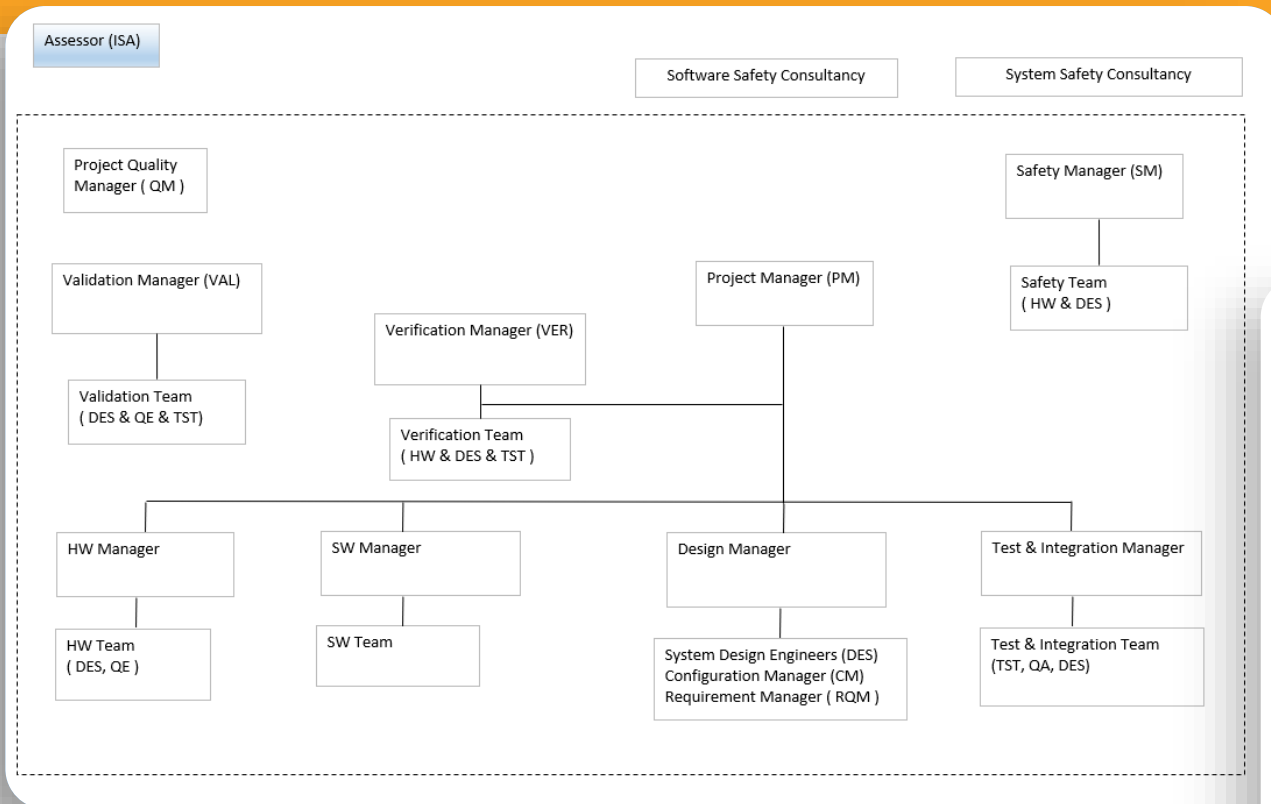
- Analysis
- Engineering activities

Reduce the frequency and impacts of hazards

- Safety Measures
- Safety Related Application Conditions (SRAC)



SAFETY | ORGANIZATION



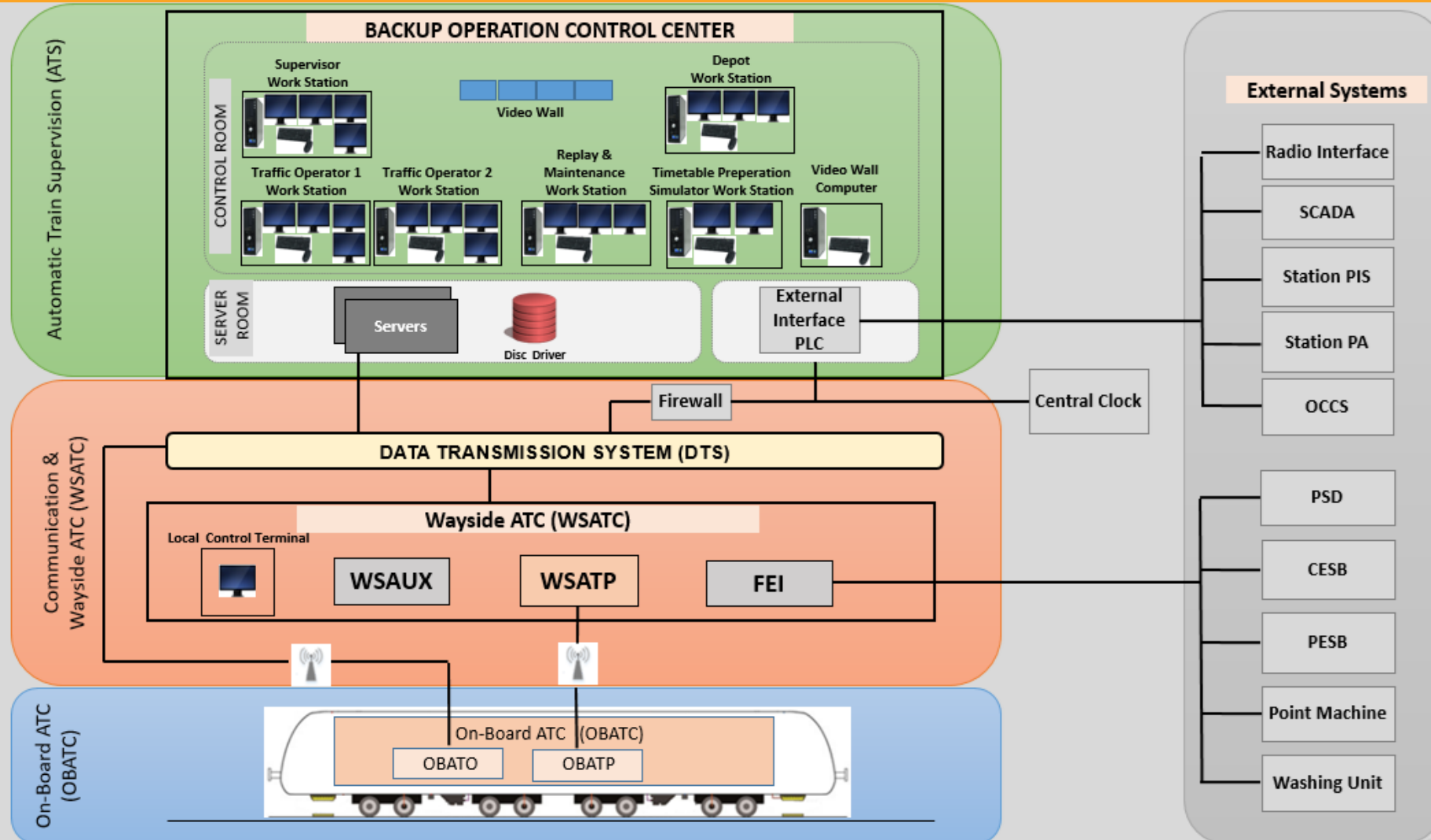
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AUTOMATIC
TRAIN CONTROL

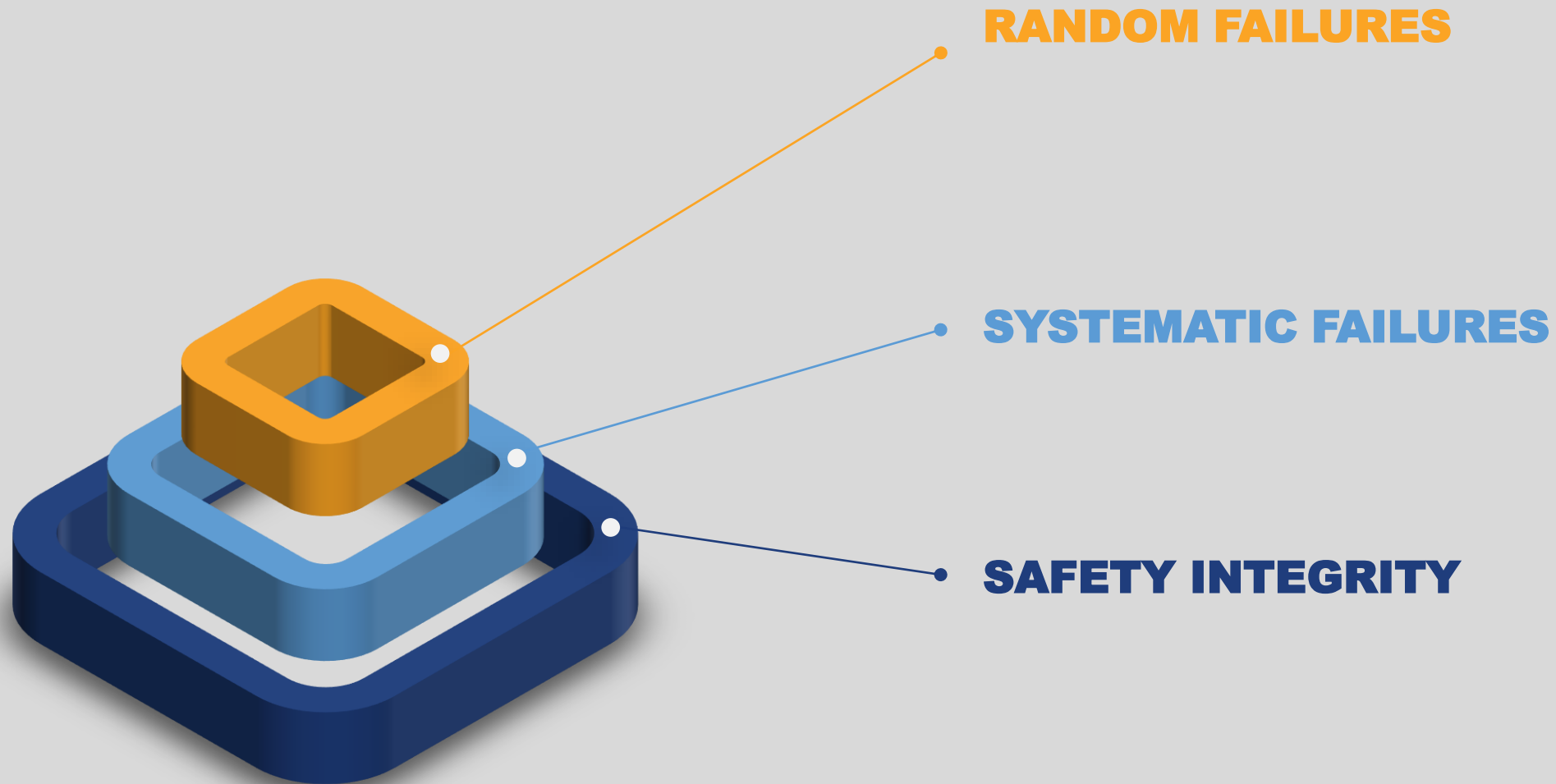


ATC | KEY COMPONENTS





ATC | SAFETY RELATED DESIGN PRINCIPLES





ATC | SAFETY RELATED DESIGN PRINCIPLES





ATC | AUTONOMOUS

AUTONOMOUS

- Accurate Operation
- Adaptive Planning
- High Capacity
- High Punctuality
- Low Error Rate
- Progressive Improvement



SAFETY

- Determinism
- Accuracy
- Low Error Rate
- Progressive Improvement



PROJECTS | GYH & HYH METRO PROJECTS





PROJECTS | GEBZE-DARICA METRO (GDM) PROJECT

İdare:	Altyapılar Genel Müdürlüğü
Müşteri:	EZE
Hat Uzunluğu:	15,4 km
Operasyon Hızları:	80 km/s
İstasyon Sayısı:	11 istasyon
Araç Sayısı:	28 Araç (4 Araç x 7 set)
Otomasyon Seviyesi:	Sürücüsüz (GoA4)
Emniyet Seviyesi:	SIL4
Emre Amadelik:	Sıcak yedekli sistem tasarımı
Kumanda Merkezi:	2 adet coğrafi ve sıcak yedekli merkez
Depo bölgesi	



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**THANK
YOU**