

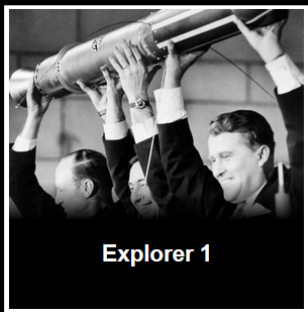


**NASA Supply Chain Quality Assurance Conference 2018**

## **Evaluating CubeSat Supplier Capabilities & Risks**

Derek Garcia | Technical Group Supervisor | Procurement Quality Assurance  
October 25, 2018





**Explorer 1**



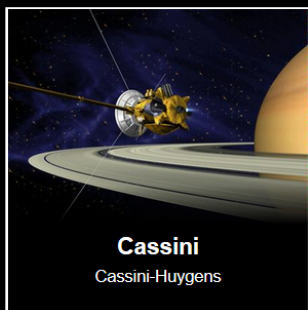
**Galileo**



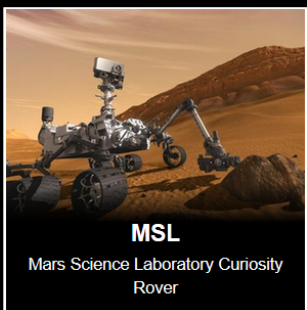
**Mars Pathfinder /  
Sojourner Rover**



**Juno**



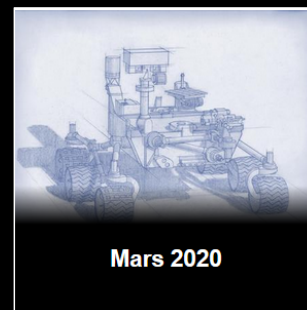
**Cassini**  
Cassini-Huygens



**MSL**  
Mars Science Laboratory Curiosity  
Rover

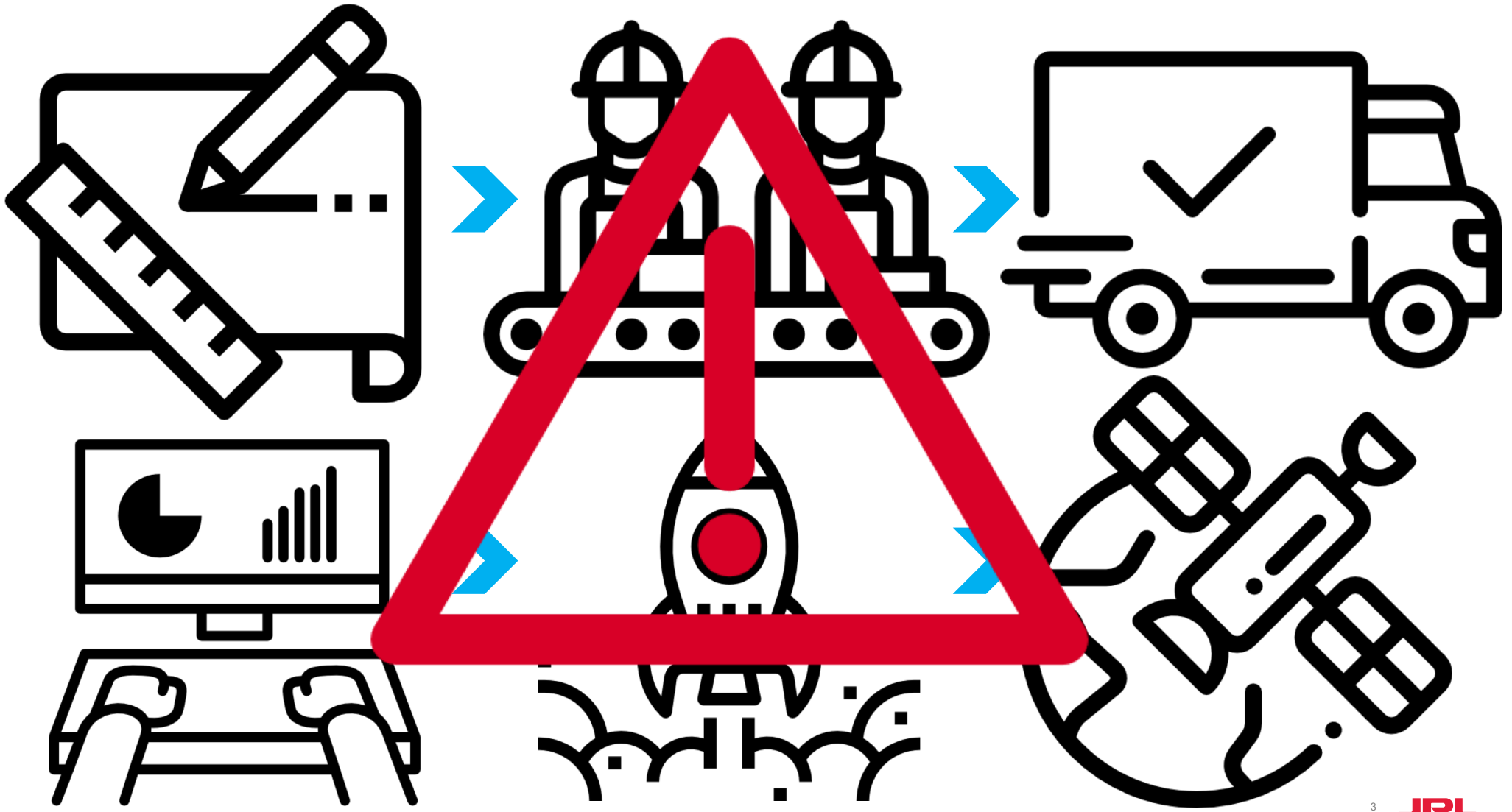


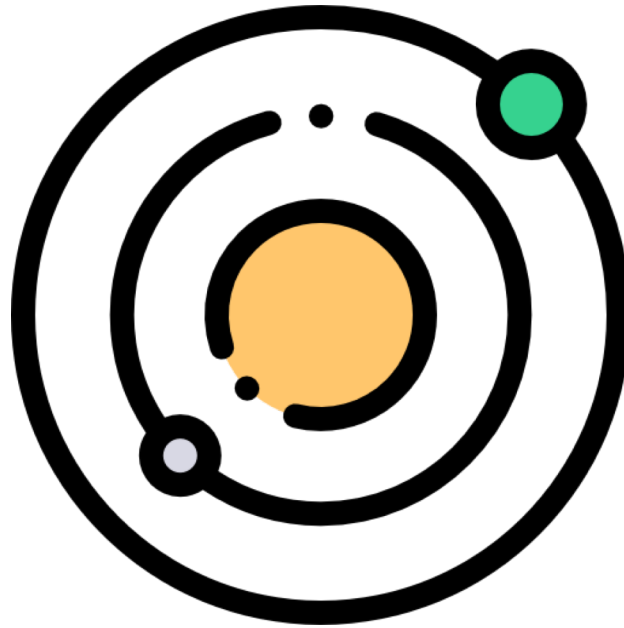
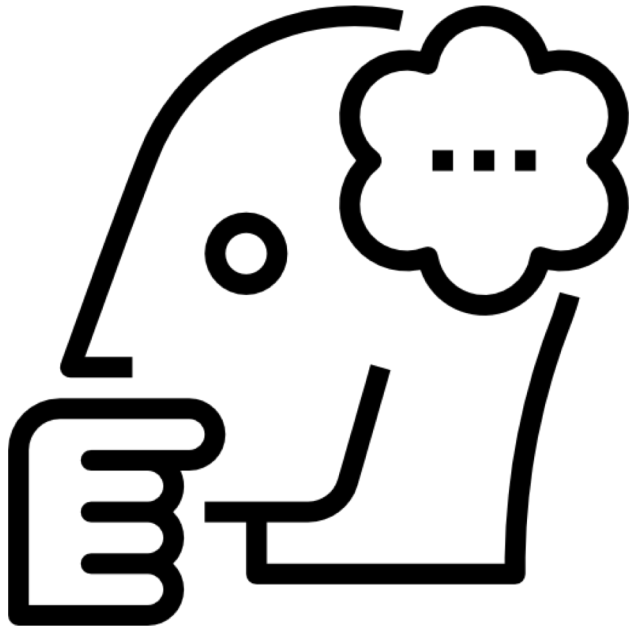
**InSight**



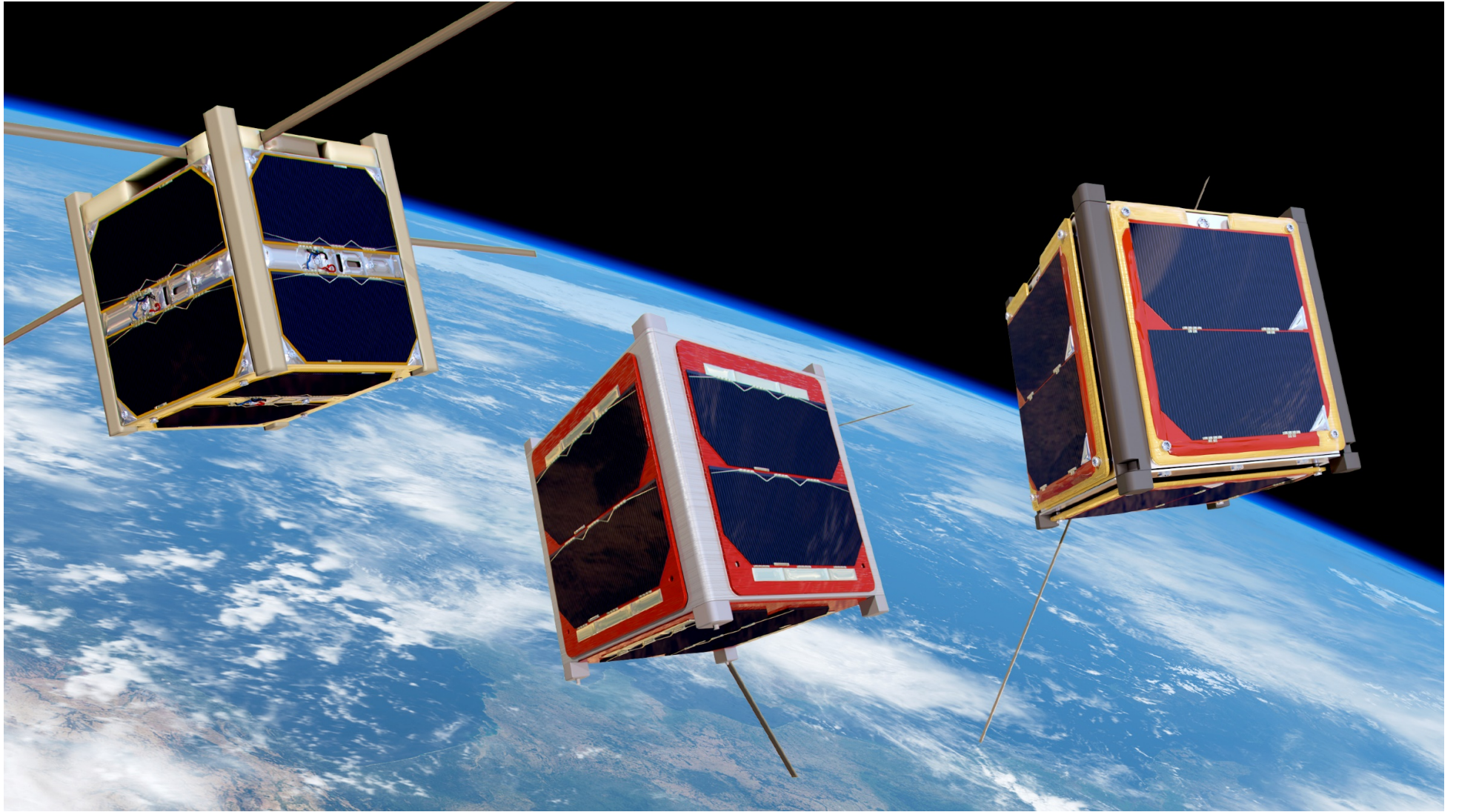
**Mars 2020**











**What is a CubeSat?**

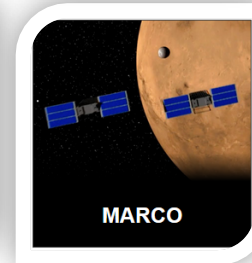
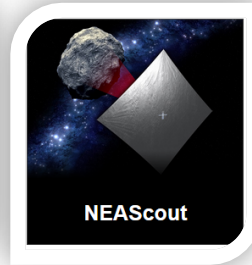


**CubeSat:** a satellite using a standard size and form factor, specifically a "one unit" or "1U" measuring 10x10x10 cm and is extendable to larger sizes; 1.5, 2, 3, 6, and even 12U.

**Benefit:** provide a cost effective platform for science investigations, new technology demonstrations and advanced mission concepts using constellations, swarms disaggregated systems



# ...since 2013



# Some Challenges with CubeSats

## Project

- Short schedule
- Low/limited budget
- Oftentimes under resourced

## Technology

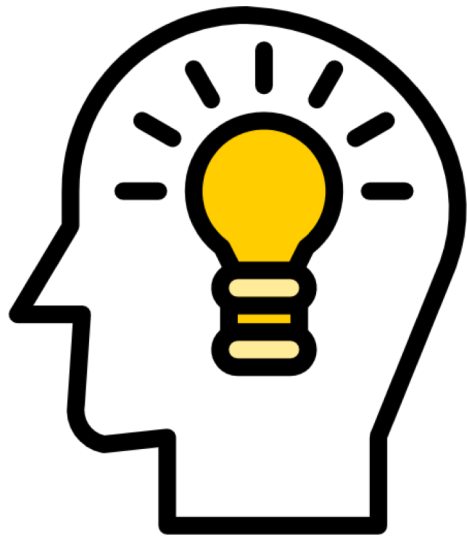
- Relatively new
- Limited supply base
- Limited flight heritage



## Performance

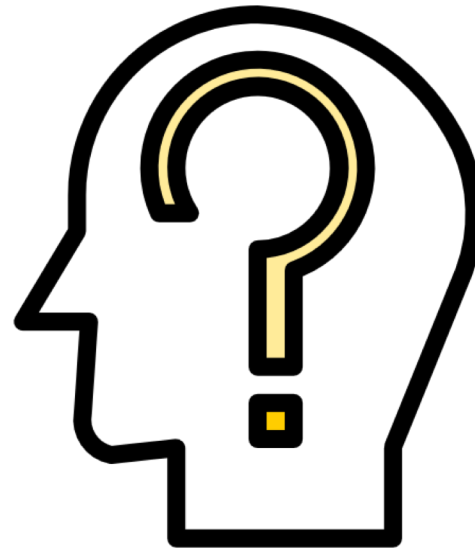
- Infant mortality
- Limited/poor communication
- Partial or full mission failure





**known  
risk**

**vs.**



**unknown  
risk**

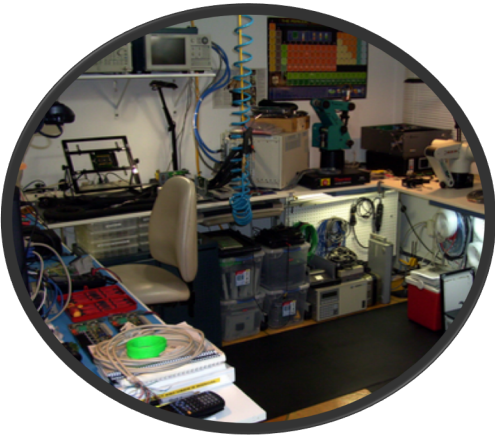


# AS9100D

CERTIFIED

# ISO 9001





Have you ever TRIED to schedule an audit with a CubeSat supplier?



Which sounds more inviting?

"Hello. I'm calling from JPL and we would like to come and **audit** your facility".

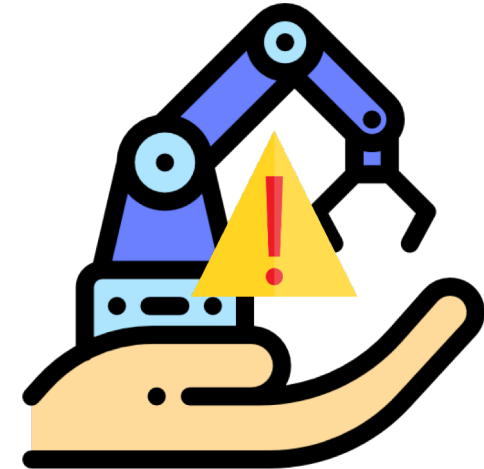
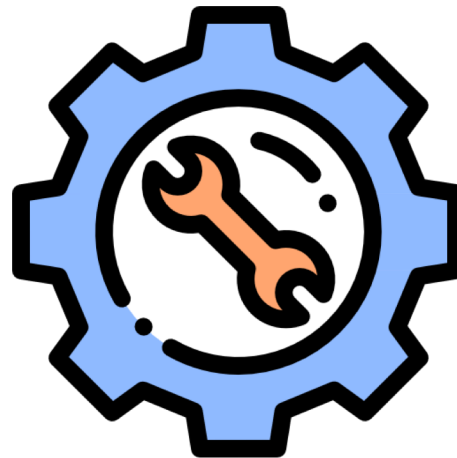
or

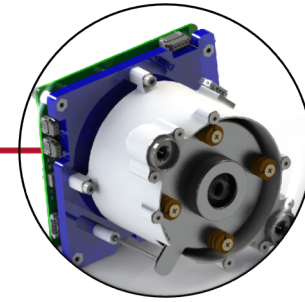
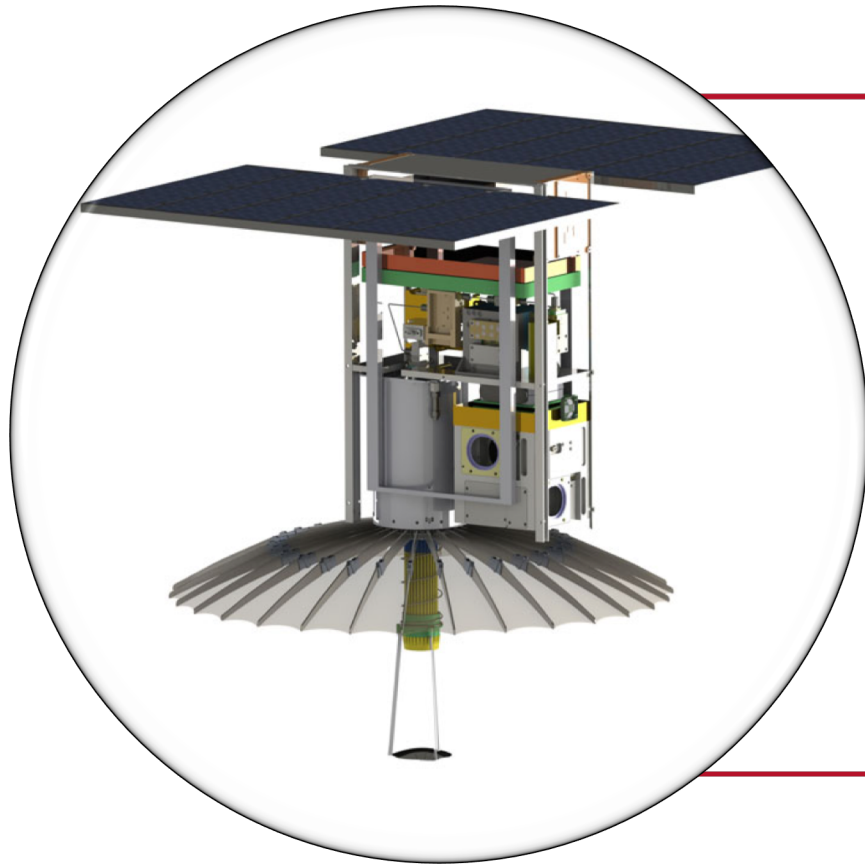
Hello. I'm calling from JPL and we would like to come and **visit** your facility".

# It's not an audit.

- **Not a QMS Audit**
  - Focused assessment, targeting key, potentially high risk, critical processes and areas
- **Minimal Impact to Supplier**
  - 1/2 day assessment
  - 1 JPL Auditor & 1 JPL SME
- **No Findings Issued Against the Supplier**
  - Gaps/Risks captured as Observations
  - JPL responsible for mitigating identified risks
- **Supplier is Added to the JPL Approved Supplier List**
  - Projects are free to procure from the Supplier once approved

# Supplier Visit

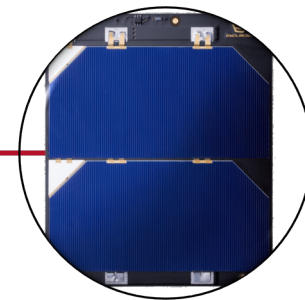




**Propulsion  
Systems**

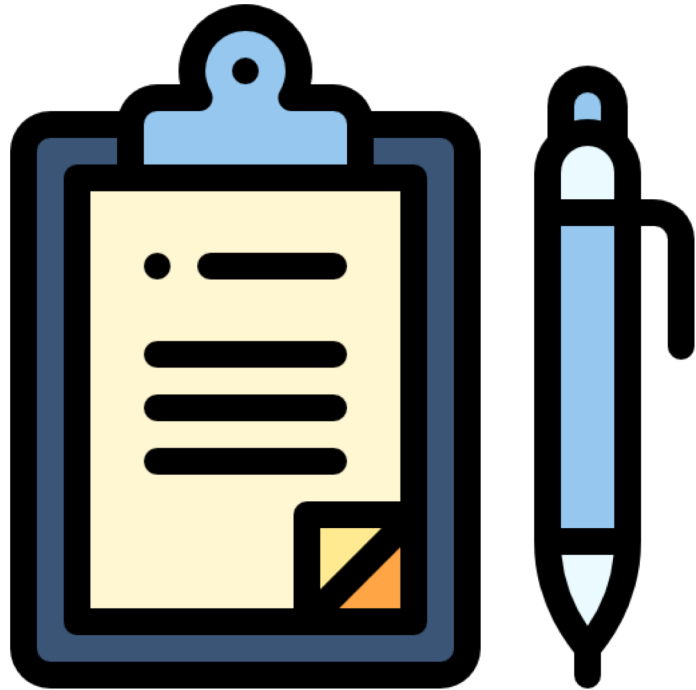


**Reaction  
Wheels**



**Solar  
Panels**

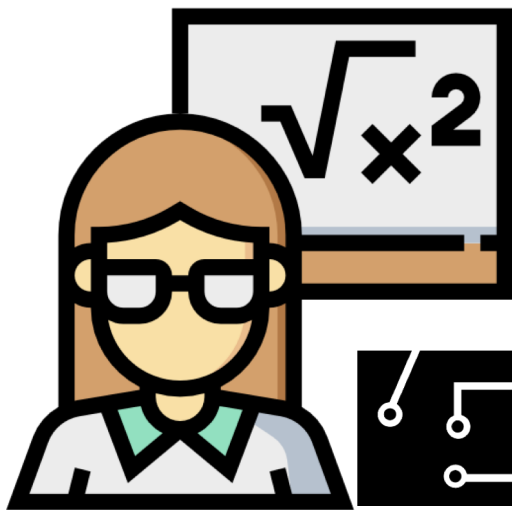




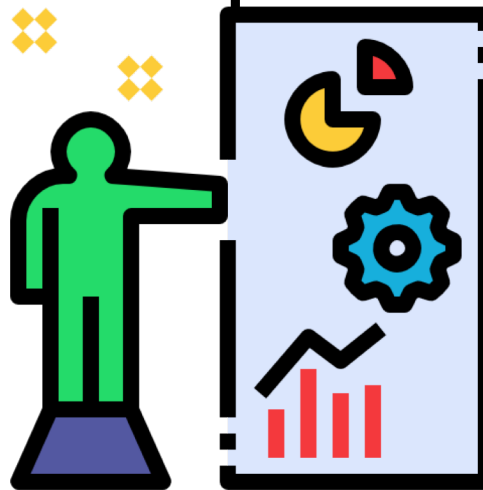
**Supplier Visit  
Information  
Survey**

- **Design**
- **Production**
- **Assembly**
- **Testing**
- **Deliverables**
- **Organization**
- **Personnel**
- **Other**

# POA



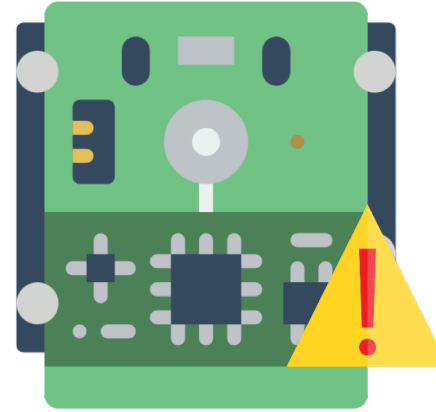
SME

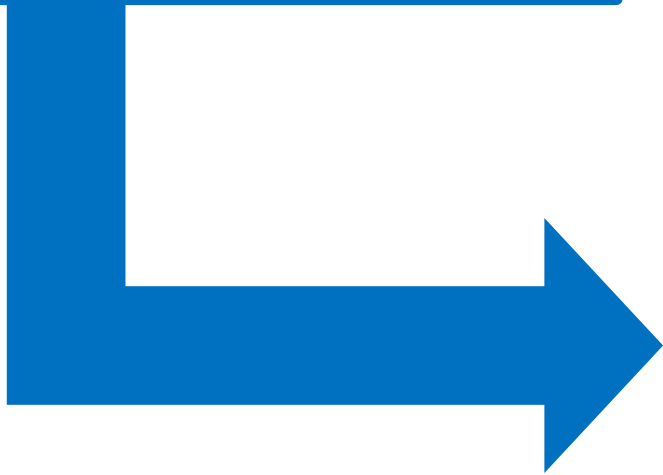


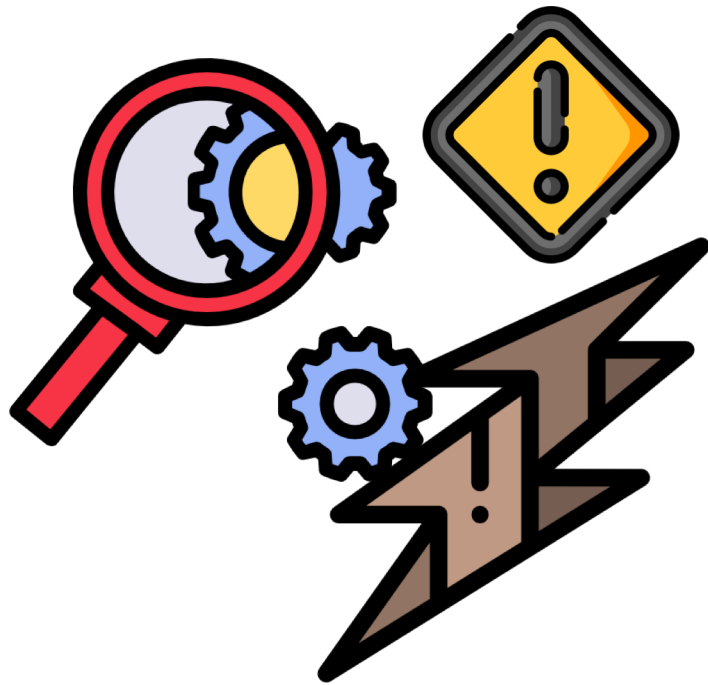
Project



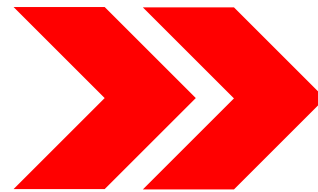
Other







Identify risks  
& gaps



Observations

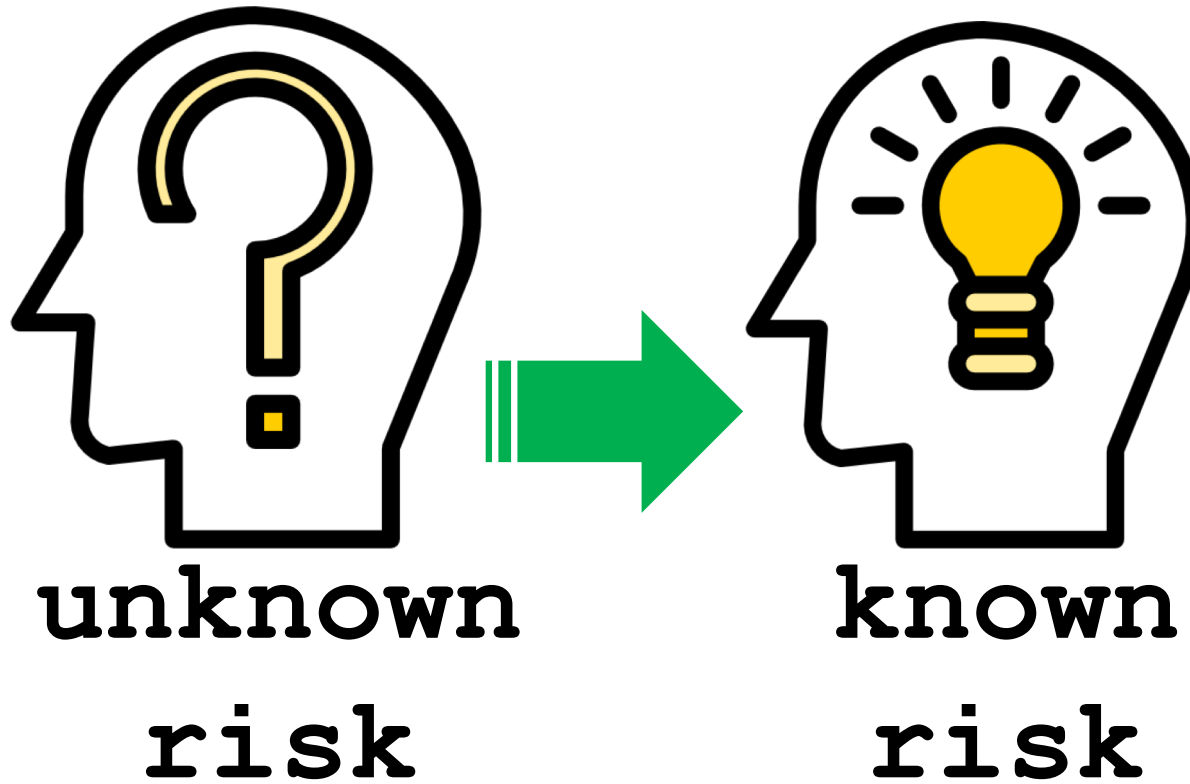


Opportunities  
for Improvement



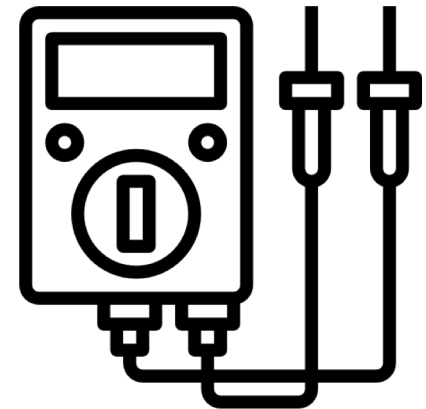
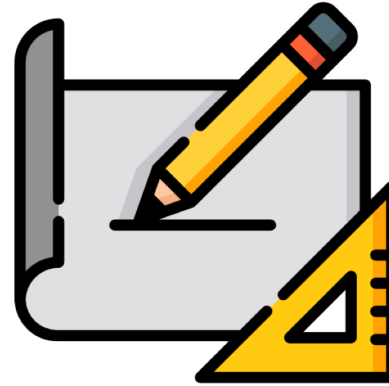
# Audit vs. Visit

	QMS AUDIT	SUPPLIER VISIT
<b>PRIMARY PURPOSE</b>	Evaluate QMS	Identify & Reduce Unkown Risk
<b>SCOPE</b>	All QMS	Critical/High Risk Processes (Quality & Technical)
<b>ATTENDEES</b>	Team of Auditors	1 PQA Auditor , 1 SME
<b>DURATION</b>	1-2 Days	0.5 Days
<b>GAPS &amp; RISKS</b>	Findings (Major, Minor), Observations	Observations Only
<b>GAP/RISK RESPONSIBILITY</b>	Supplier	JPL

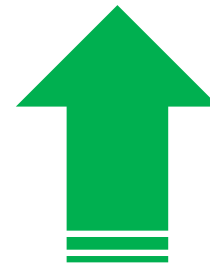
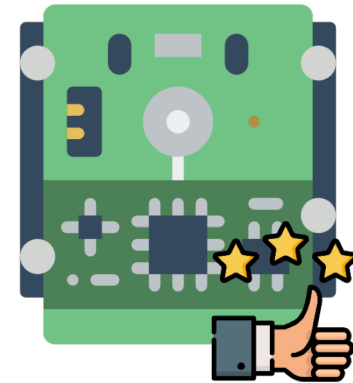
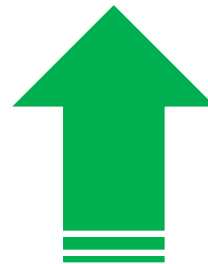
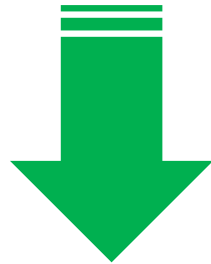
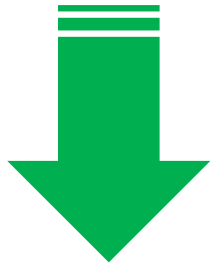




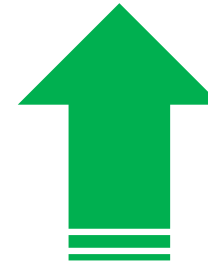
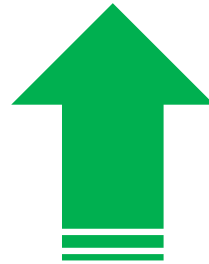
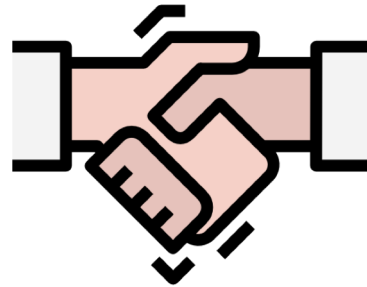
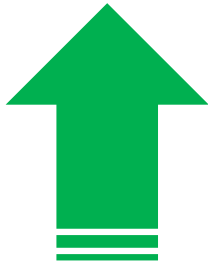
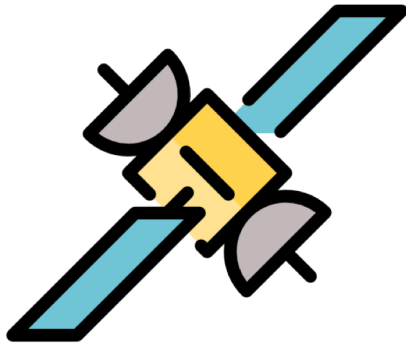
known  
risk



# Project Benefits



# Big Picture Benefits

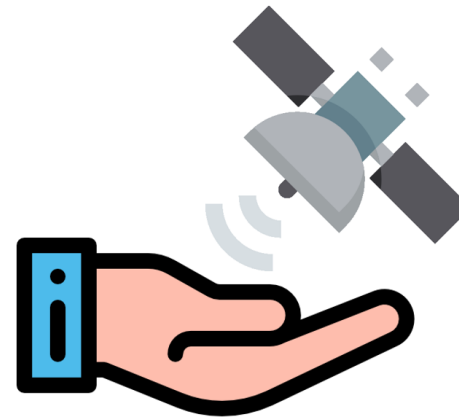
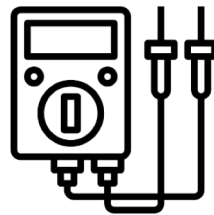




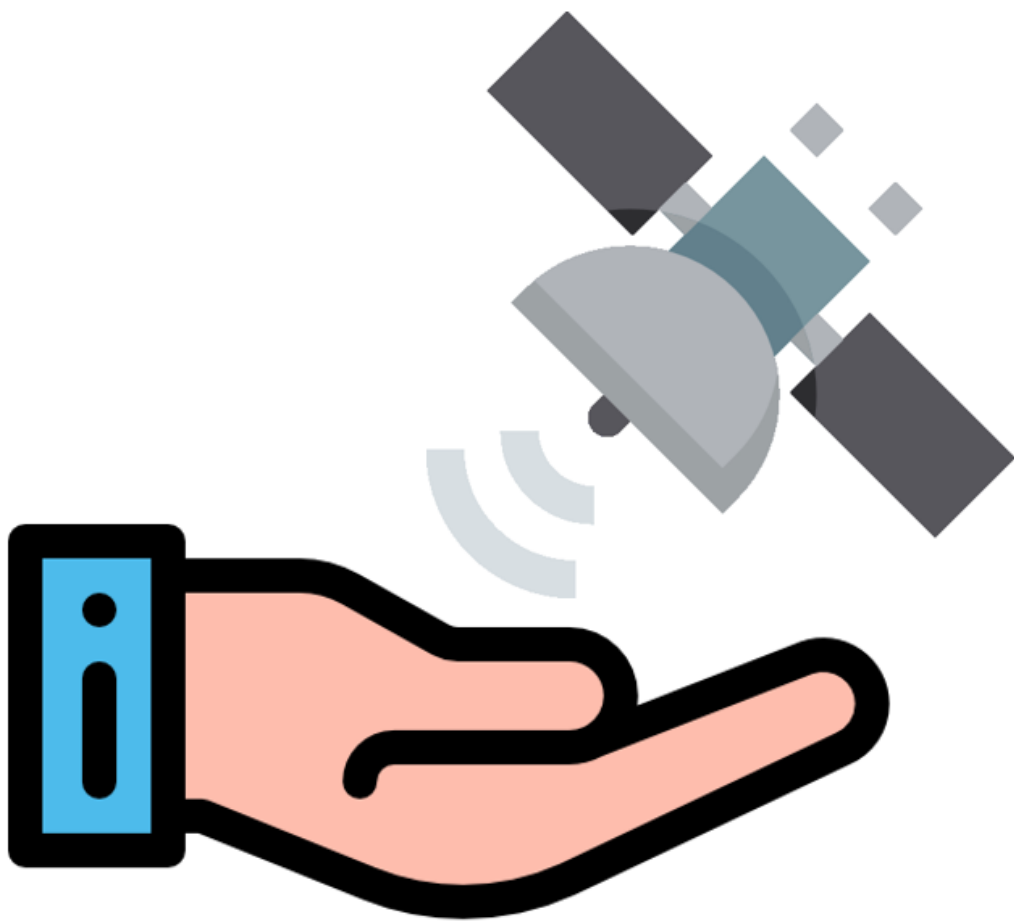
# Supplier Visit

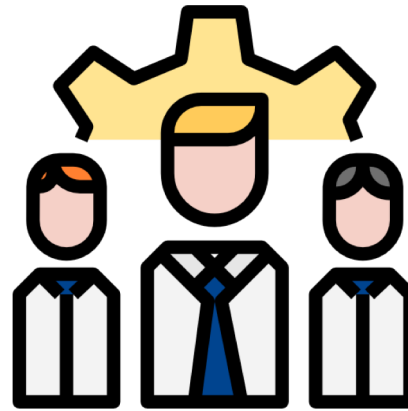


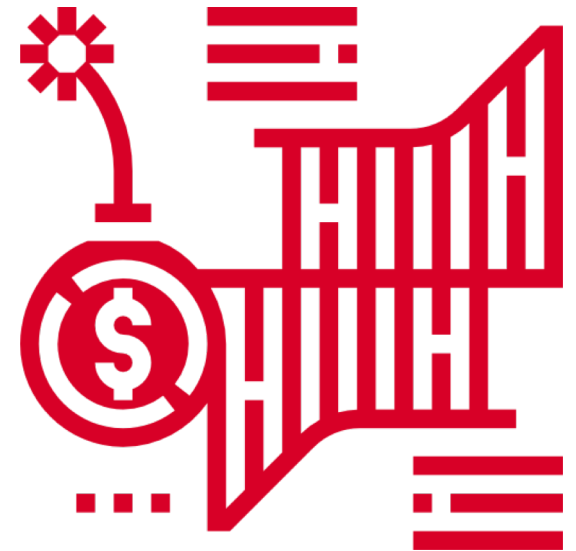
known risk



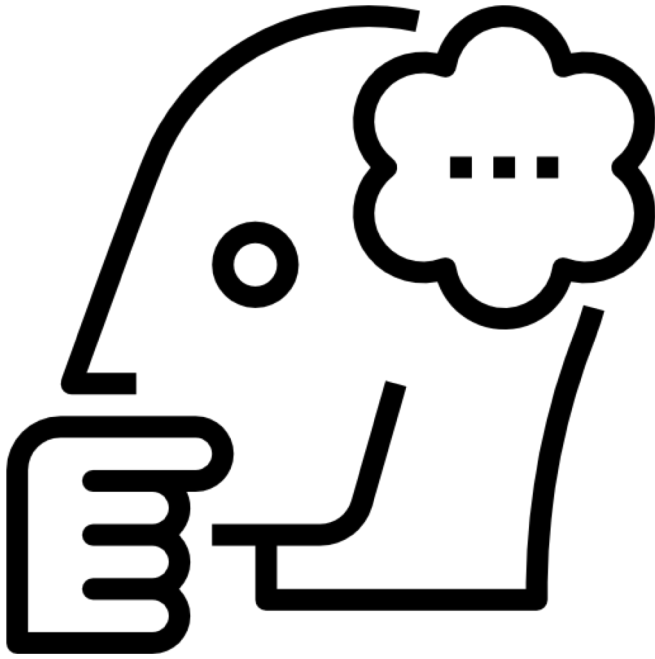


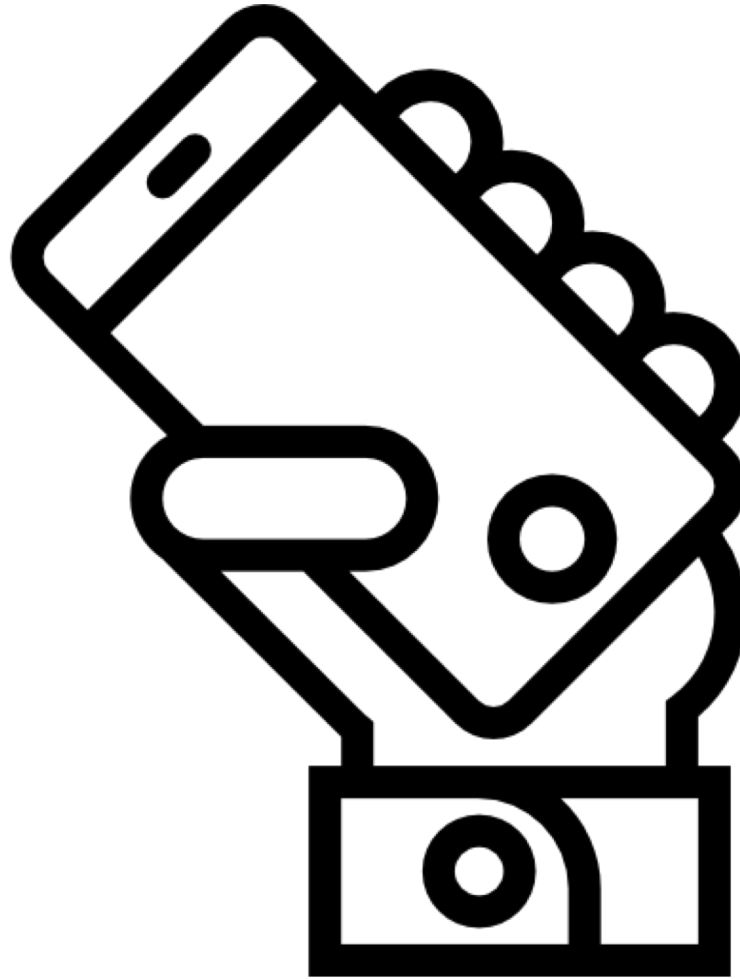


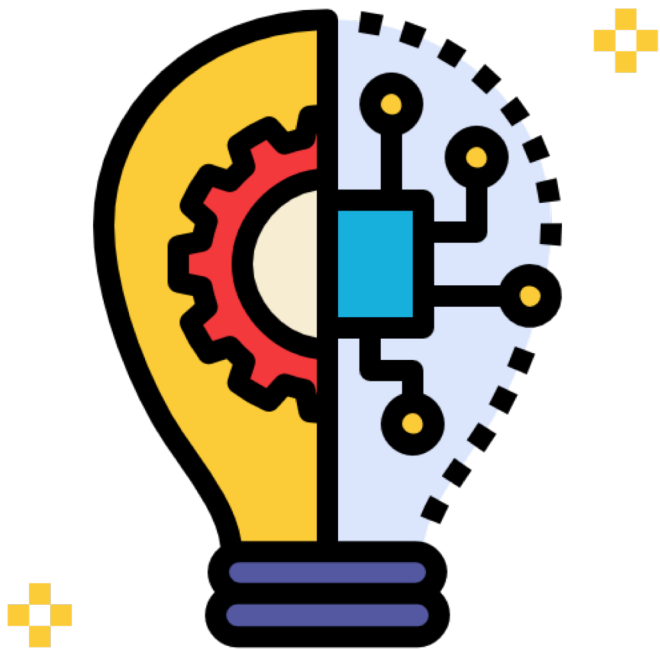


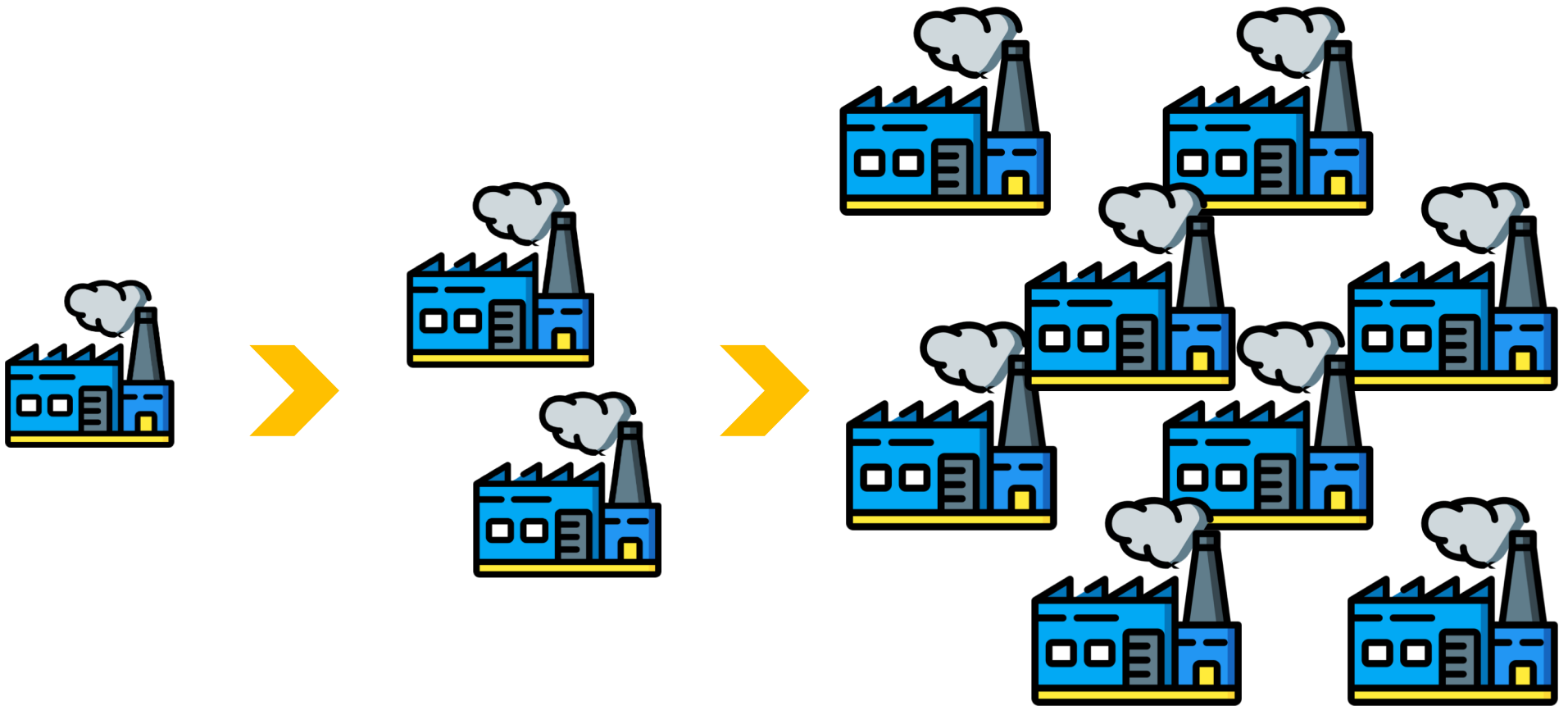


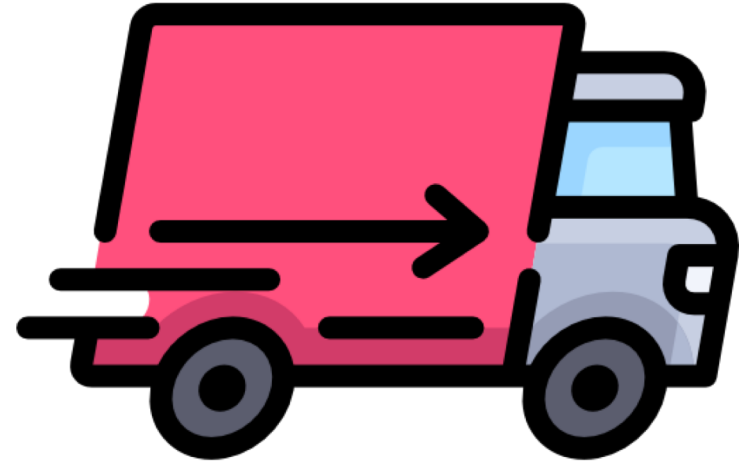
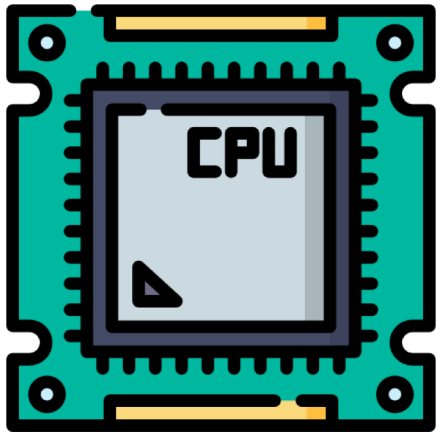


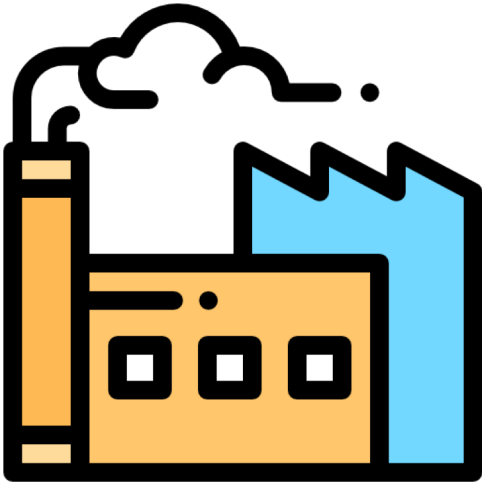


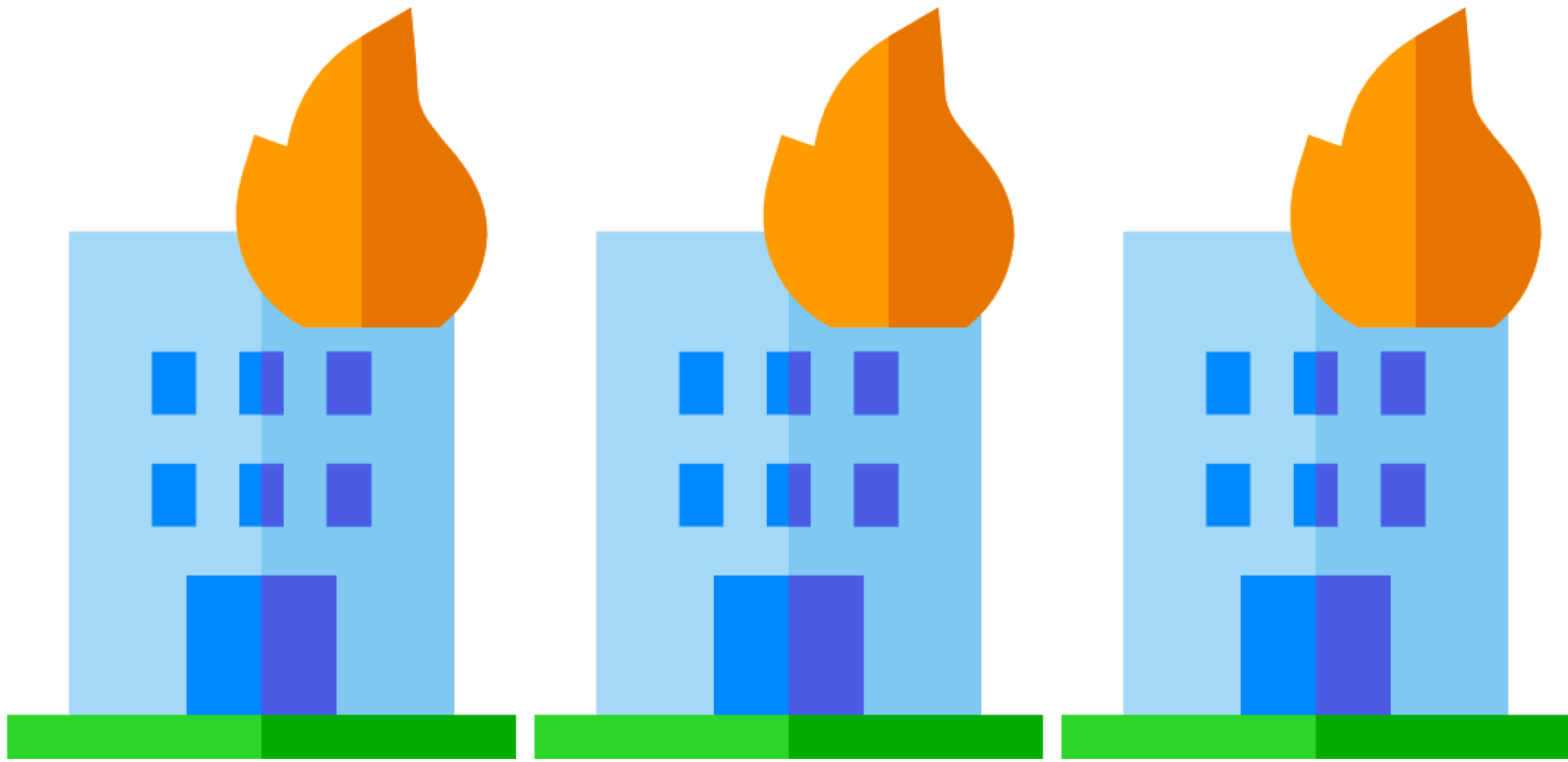






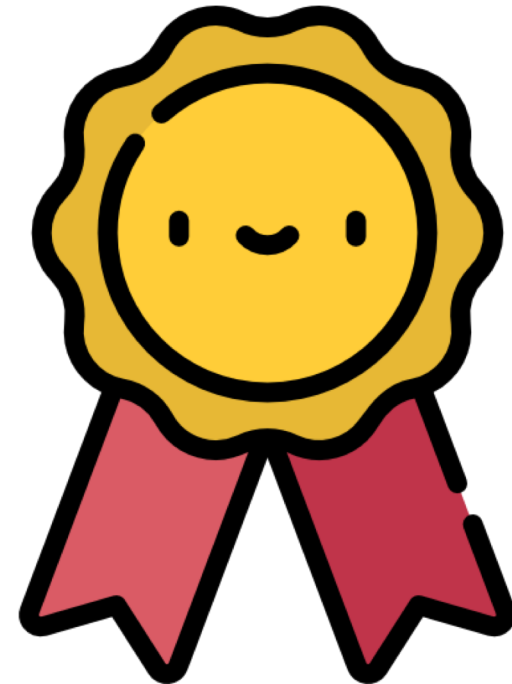


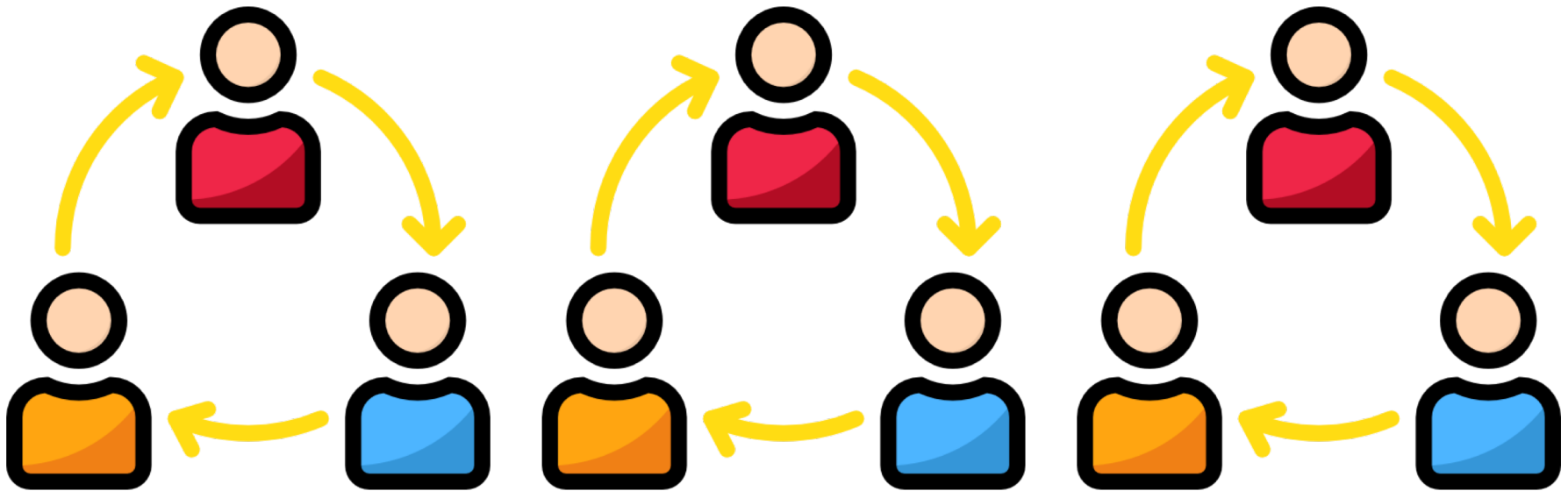


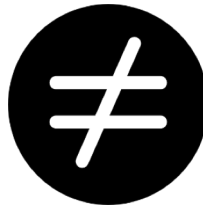


**supplier risk**



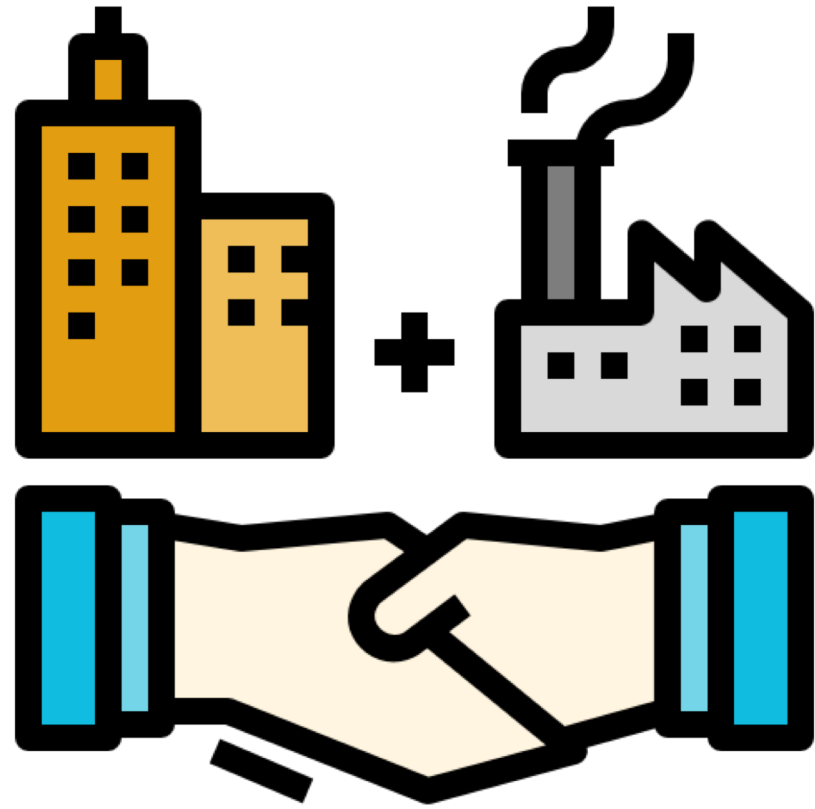






AS9100  
ISO9001

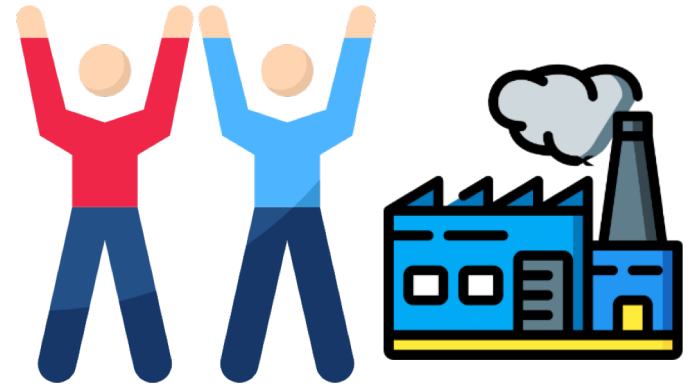
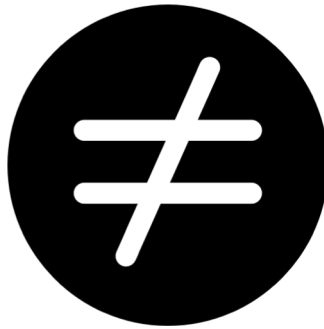






AS9100  
ISO9001







**vs .**





- Document Control
- Training
- Infrastructure & Work Environment
- Planning/Product Realization
- Contract Review
- Customer Feedback
- Design & Development
- Purchasing
- Production & Service Provision
- Traceability
- Customer Property
- Preservation of Product
- Calibration
- Control of Non-Conforming Product

- Monitoring & Measurement
- Corrective Actions
- Sub-Tier Supplier Management
- Verification of Product
- Analysis of Data
- Safety
- Counterfeit Parts Control
- Other Technical Considerations

