



**Sounding  
Rockets and  
teamwork at  
NASA**  
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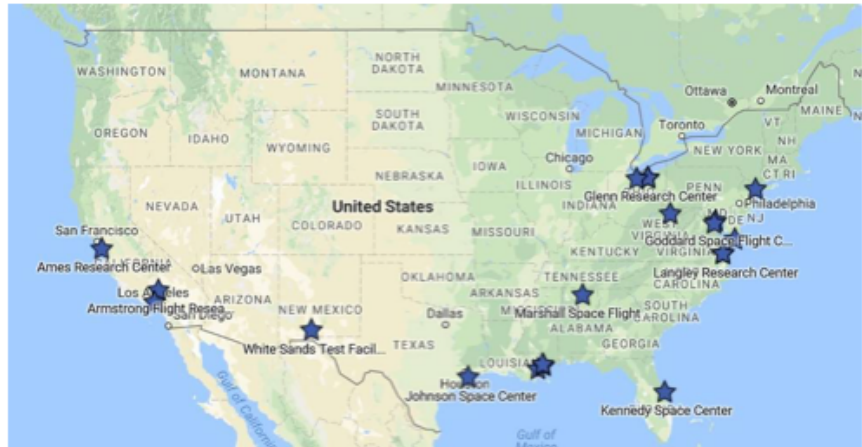
13 September 2019  
HS seminar

National Aeronautics and  
Space Administration



**EXPLORE  
MARSHALL**

- 17 locations
- Space and aeronautics
- Hardware, software, science
- Logistics and support



## NASA Overview

IMAGE: Map image from NASA website: <https://www.nasa.gov/careers/where-we-work>

- 
- **Research** – space, earth, planets, flight, plasma, biology, atmosphere...
  - **Engineering** – mechanical, thermal, electrical, optical, propulsion, materials, software, guidance, systems...
  - **Flight support** – ground control, safety, test facilities, data handling, program management...
  - **Personnel support** – HR, legal, IT, administrative, managers, facilities, budgets, procurement, contracts, communications...



## Example NASA Careers

- Undergrad: Physics BA
- Masters & PhD: Astrophysics (Solar)
- 3 Postdoc positions around the world
- Research: The magnetic field of the solar atmosphere.
- Methods: Numerical simulations, solar image analysis, instrument building



**Solar Physics – my background**

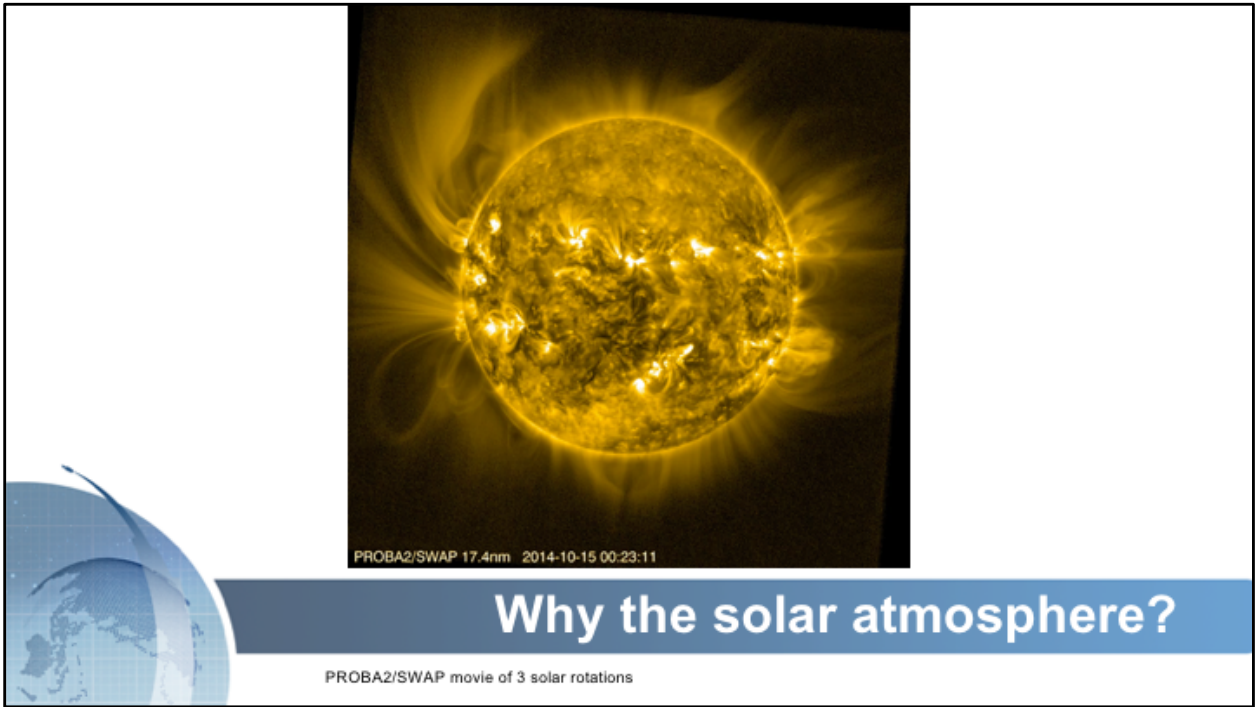
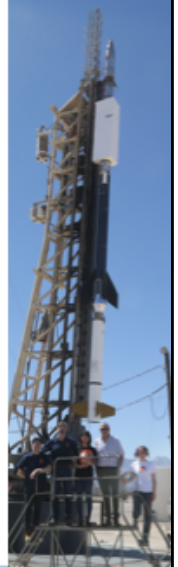


IMAGE: Self-made movie with ESA science data

- Sub-orbital flight lasting 10-30 min
- Max altitude ~250-350 km (150-215 mi)
- Atmospheric measurements or new space instrumentation
- 1-3 solid fuel rocket boosters
- Payloads: 1-2 ft diameter, 2-10 ft long
- Low Cost Access to Space



## What is a Sounding Rocket?

Photo Credit:  
U.S. Army Photo, Louis Rosales

IMAGE: Photo approved for public release as part of the CLASP2 NASA mission. All people in the photo are CLASP2 team members and have given explicit permission to use their likeness when discussing the CLASP2 launch.



IMAGE: Movie made by LASP for NASA funded EVE rocket flight. PI is Dr. Tom Woods. Explicit permission was given on 13 Feb 2018 to use this movie for outreach purposes.

- 7 rocket flights, 5 successful missions
- 3 future flights
- 2 concept missions
- First flight was July 2010
- All rockets carry payloads with new sun-looking telescopes.

- What elements make our team successful?



## MSFC Solar Sounding Rockets

Photo Credit:  
U.S. Army Photo, Louis Rosales CLASP2 launch, April 2019

IMAGE: Photo approved for public release as part of the CLASP2 NASA mission.



- Filter-less cold-mirror optics
- Low-noise custom cameras
- High-resolution replicated X-ray mirrors



## Hardware Advances

IMAGE: Photo taken for the CLASP2 NASA mission.

- Ground Support Equipment for testing & flight control
- Onboard computer
- Control software
- LN2 cooling system and control hardware and software



Typical ground support for flight and testing

## Modular Support Structure

IMAGE: Photo taken for the CLASP2 NASA mission, person in photo is NASA civil servant.

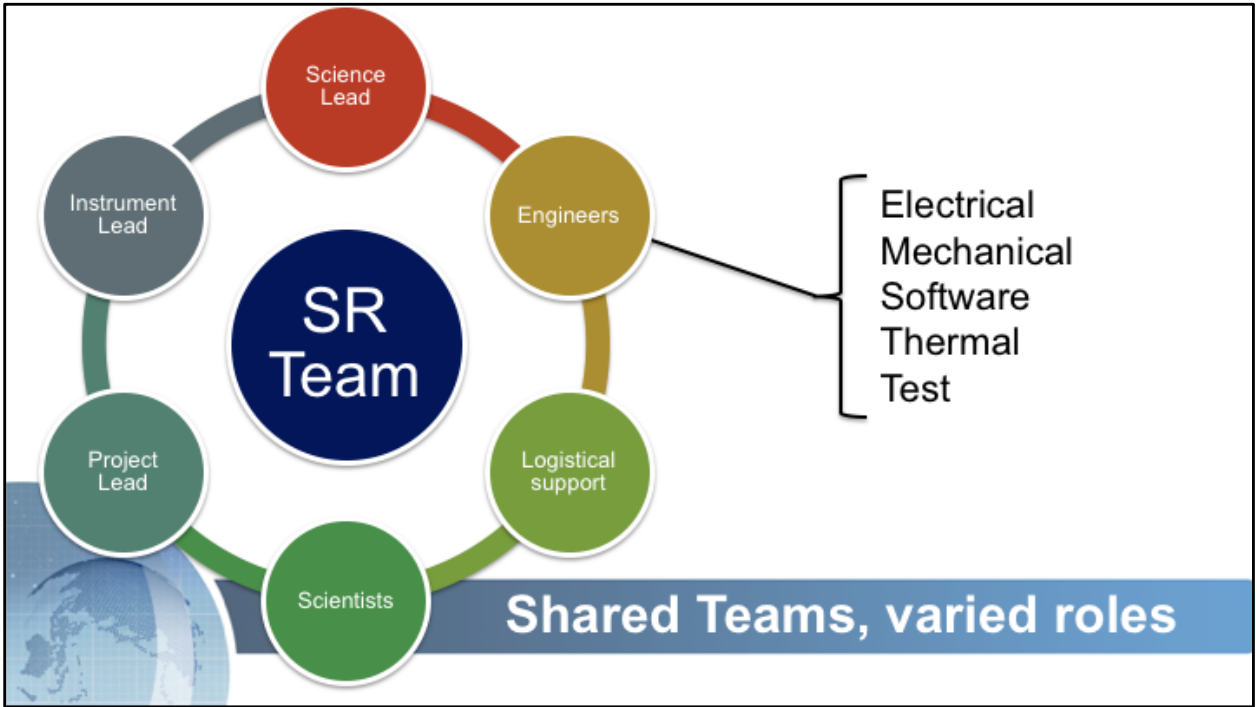
- US scientific groups
- US vendors and hardware groups
- International groups and vendors



## Collaborations

Photo Credit:  
U.S. Army Photo, Louis Rosales

IMAGE: Photo approved for public release as part of the CLASP2 NASA mission. All people in the photo are CLASP2 team members and have given explicit permission to use their likeness when discussing the CLASP2 launch.



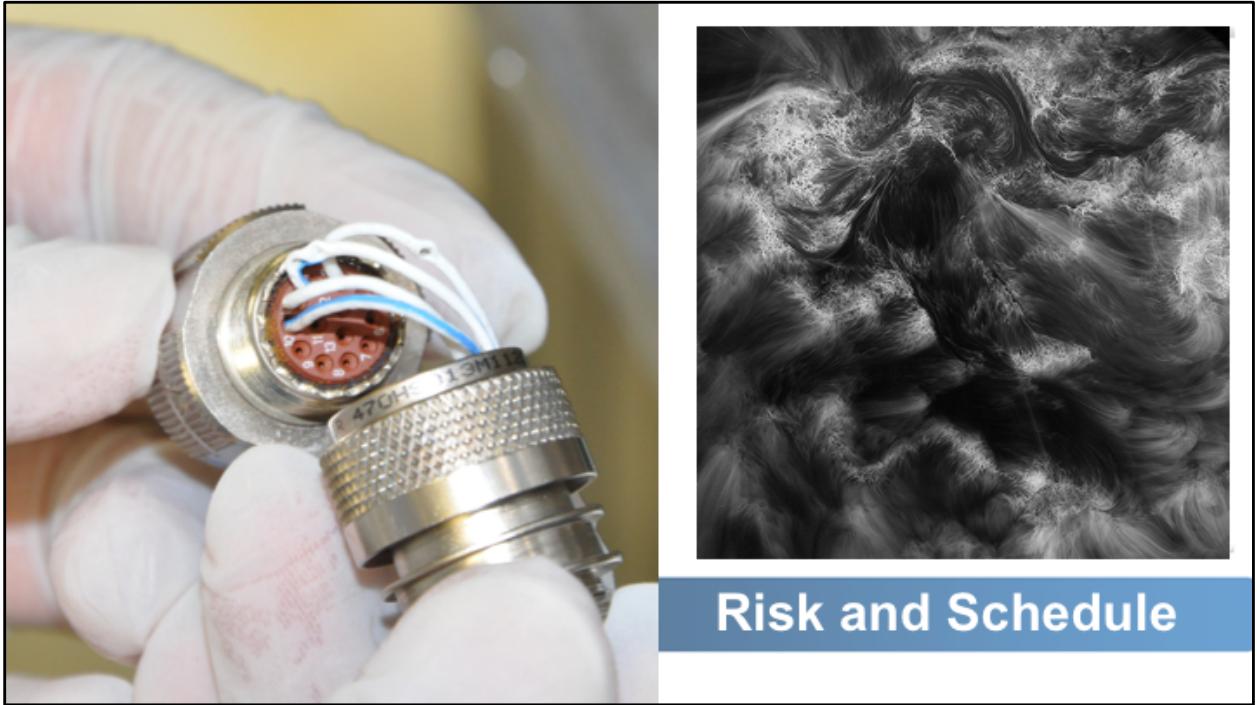


IMAGE left: Non-sensitive photos taken as part of the HiC-2 NASA mission.  
IMAGE right: Scientific data from the HiC NASA mission.

**Stretch break: move around!**

"The way a team plays as a whole determines its success. You may have the greatest bunch of individual stars in the world, but if they don't play together, the club won't be worth a dime."

– Babe Ruth

**Working in a team**

- General knowledge of field
  - Gets you an entry level job
- Ability to learn and work in teams
  - Gets you promoted



How to get ahead



- Your knowledge/idea/work won't help anyone you if you can't communicate it effectively
  - Practice writing
  - Read for fun
  - Learn effective presentations

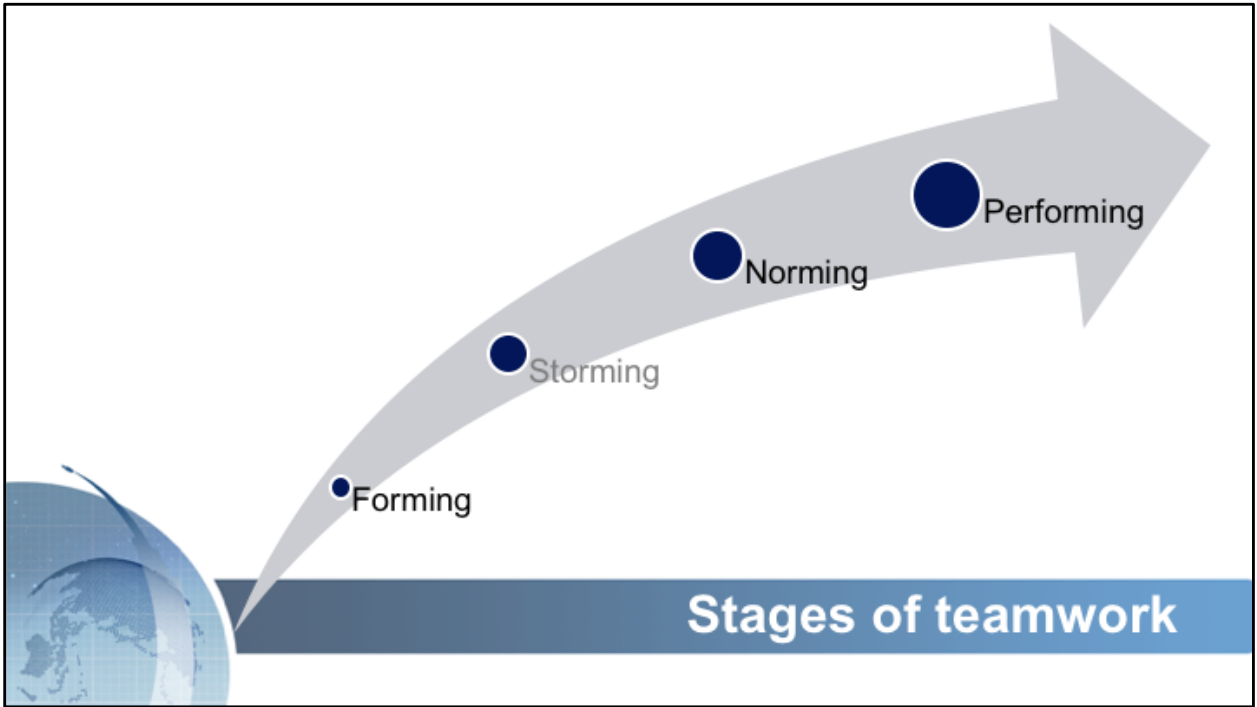


**Communication**

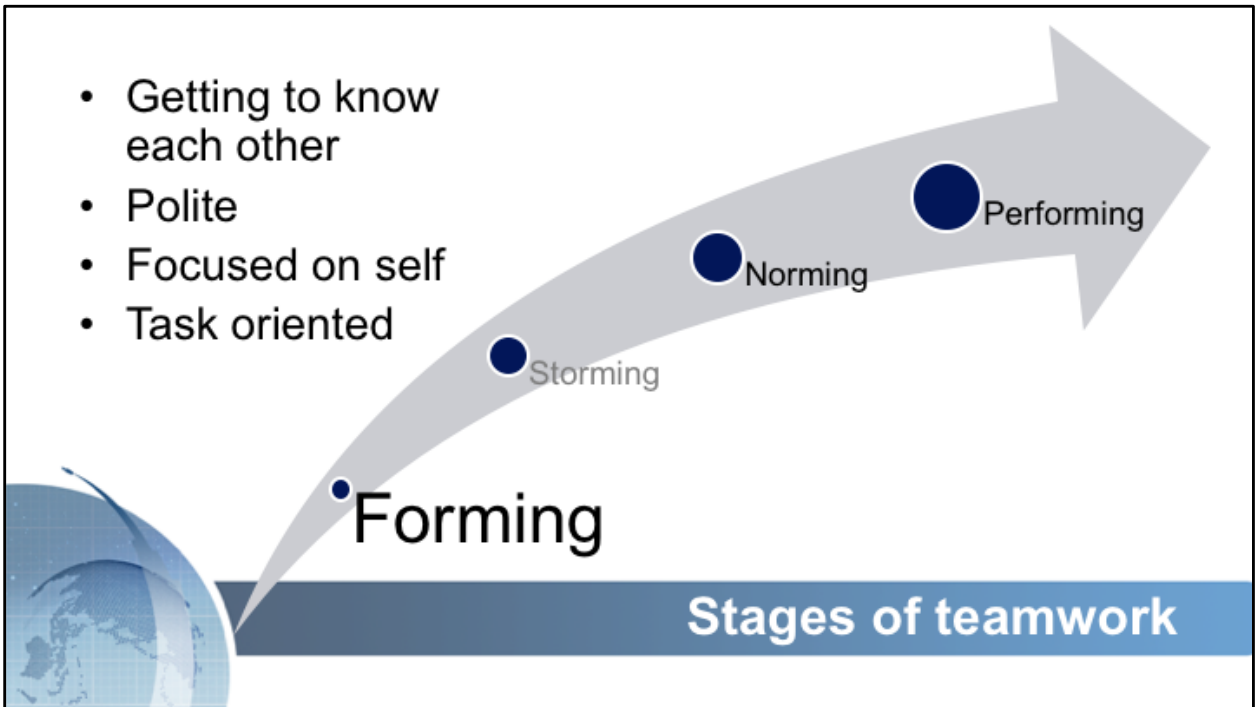
- STEM progress happens in large and small groups.
- Learning how to work in a team now will serve you well later.
- Seek out team mates who are different than you, with different strengths
- You won't like everyone that you work with.



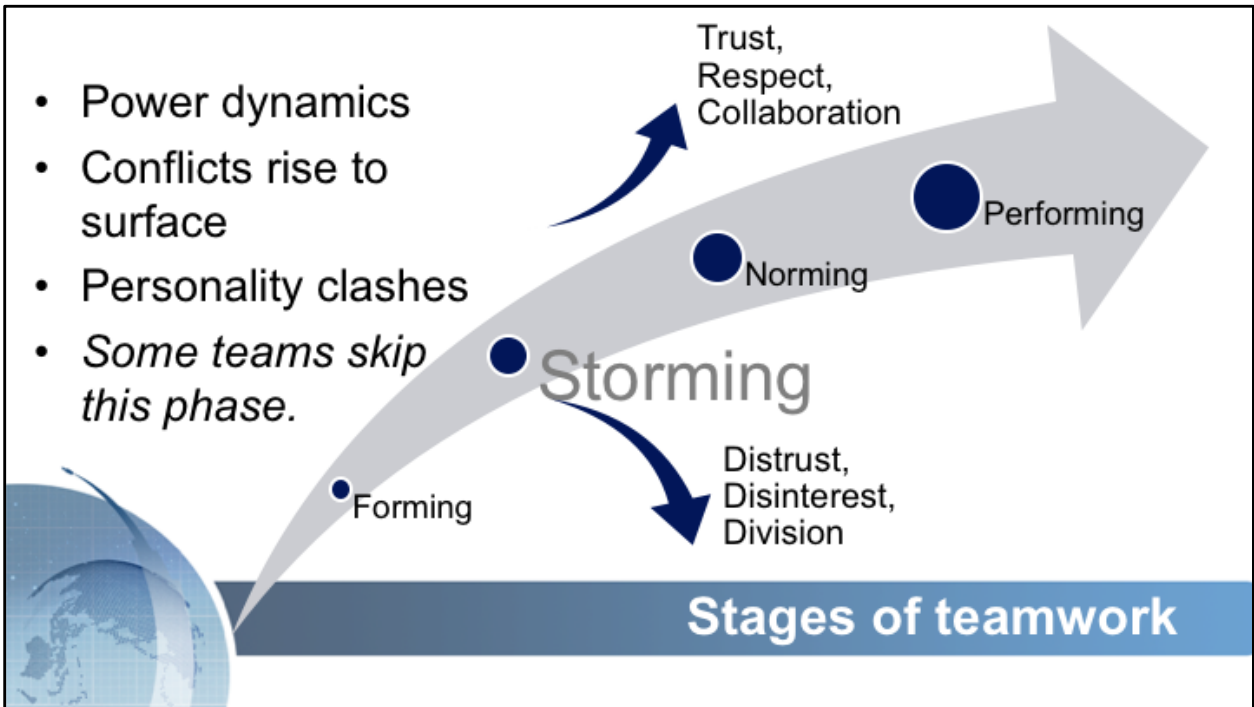
**Works well with others**



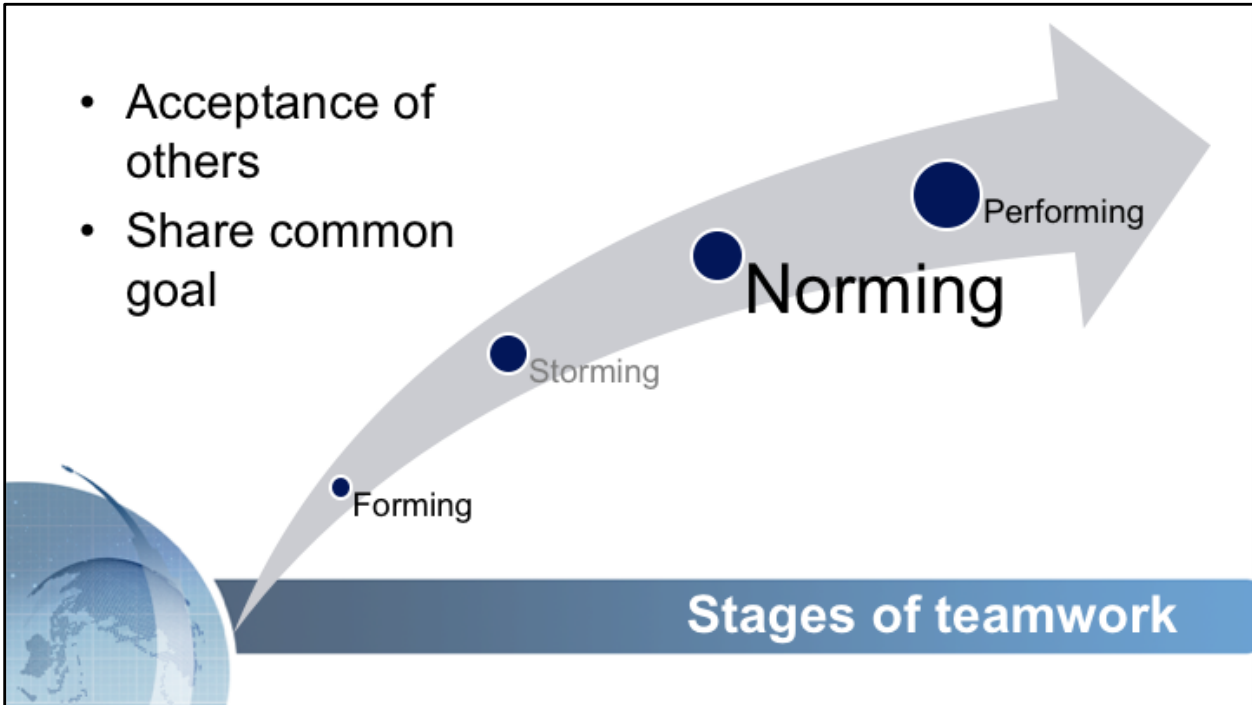
- Getting to know each other
- Polite
- Focused on self
- Task oriented

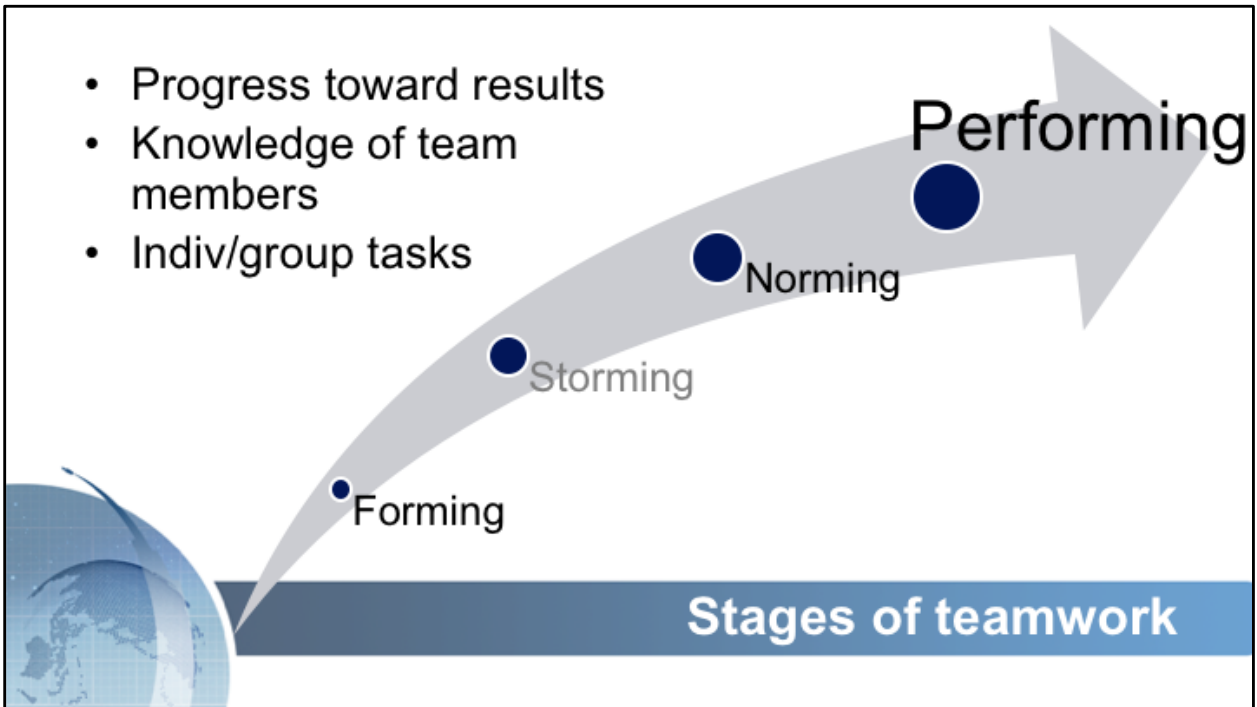


## Stages of teamwork



- Acceptance of others
- Share common goal





# Conflict is inevitable

**How will you react?**



- **Destructive/Emotional Conflict**

- Escalate a tense situation
- Focus on people, not project
- Aggression, Ridicule, Avoidance, etc

- **Constructive/Cognitive Conflict**

- Different viewpoints lead to creative solutions
- Trust, respect, communication, adapting, reaching out



Conflict

- My teams at NASA are the best part of my job!
- Working in teams is essential for any career
- Use your project as training; it will help you in the long run!



**Teamwork**

"The way a team plays as a whole determines its success. You may have the greatest bunch of individual stars in the world, but if they don't play together, the club won't be worth a dime."

– Babe Ruth

**Working in a team**



# EXPLORE MARSHALL

MAKING HUMAN SPACE EXPLORATION POSSIBLE