

The Project



The Project Process

THINK ABOUT IT

When you meet an animal at the zoo, on a farm, or in your home, have you ever thought about whether that interaction helps you, the animal, or both? Share these situations with your team. Who is helping or being helped in each one?

Rosa lives on a farm in Syddanmark, Denmark. Rosa leads a pretty good life, for a cow. She eats grass, takes a nap, and – when she feels it’s time – she visits the robotic milking machine. The machine uses lasers to find Rosa’s udders, clean them, and then pump the milk. Rosa munches on special grain while the machine works. When it’s done, Rosa feels better and leaves the milking machine to find some more tasty grass.

Randy loves to hike in the mountains of New Hampshire, USA. However, Randy lost his sight many years ago, so hiking mountains might be difficult and dangerous. Luckily, Randy has a friend who also likes to hike: Autumn. As a trained guide dog, Autumn knows how to identify obstacles that might harm Randy or her. Even through the winter, Autumn helps Randy find a safe path over snow-covered tree roots and boulders.

Elena carefully threads fruit onto a wire at the Omaha Zoo & Aquarium in Nebraska, USA. In the wild, fruit bats would generally eat fruit hanging from trees. Since fruit doesn’t grow on the imitation trees in the jungle exhibit, Elena must think of creative ways to feed the bats. Instead of placing all of the fruit in a big pile, Elena hangs fruit from hooks or hides it somewhere unexpected in the exhibit. This way, breakfast is also an enrichment activity for the bats.

In the past, lions often attacked the livestock in Richard’s village in Kenya. Residents hunted the lions to protect their homes and farms. After trying a few ideas, Richard discovered that moving lights could scare the lions away without harming them. He invented a system of flickering lights and installed them around the village. The lights kept the lions away from the livestock, so the people had no reason to hunt the lions.

For ANIMAL ALLIESSM, think of people and animals as allies in the quest to make life better for everyone. Sometimes people help animals and sometimes animals help people. Your team’s Project mission this season is to make our interactions with animals better – hopefully better for all of us.

IDENTIFY A PROBLEM

Ask your team to think about all the different ways that people interact with animals. Sometimes people purposely seek out animals (like Autumn helping Randy hike the mountain) and sometimes it happens by accident (like the lions attacking Richard’s livestock). Have your team pick a situation in which people and animals interact, then identify a specific problem they want to solve.



Not sure where to start?

Try this process to help your team choose and explore an animal problem:

As a Team – Choose an animal. It might be an animal that lives in your home or neighborhood. It might be an animal that you have seen at a zoo, aquarium, or farm. It might be an animal that lives in the forest, ocean, desert or another habitat.

Learn about the ways people interact with this type of animal. (People must interact with this animal in some way to be valid for ANIMAL ALLIESSM.) Ask questions like:

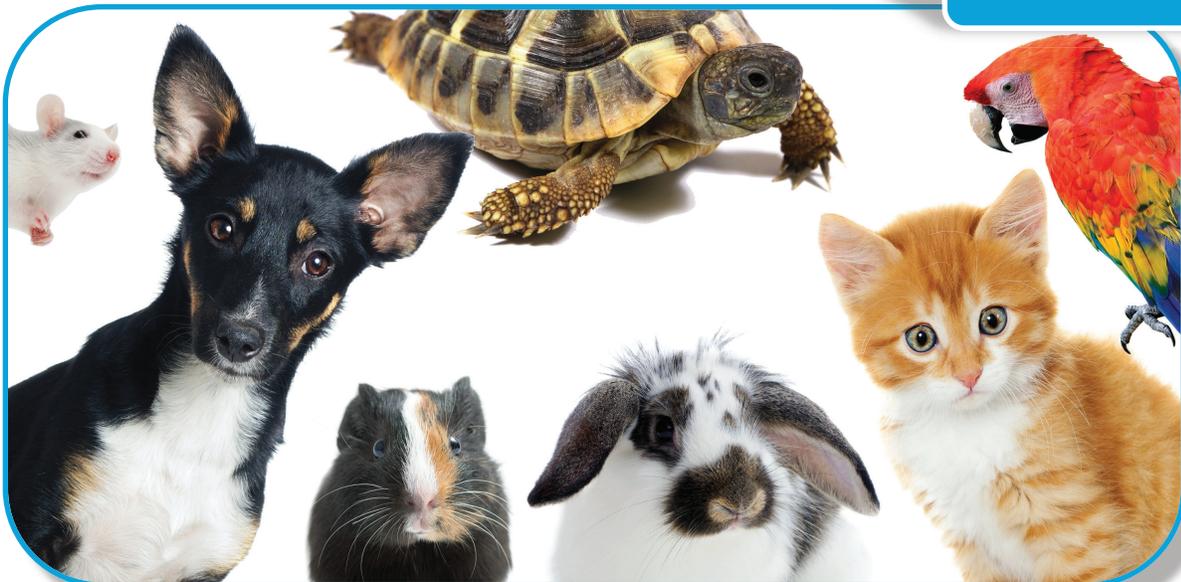
- When people interact with your animal, is it on purpose or by accident?
- Does the interaction help or hurt people, the animal, or both?
- What type of professionals work with or study your animal?
- Do you notice any ways that the interaction could be better – more productive, healthier, or happier for either the person or the animal? Look for these problems as you research.

This might be a great time for the team to interview a professional. The professional could be someone who works directly with animals or researches animal problems for his or her job. Can a professional help your team learn about animal health, safety, enrichment, or living environments?

As a Team – Identify a specific problem with the way people interact with your animal. You might select a problem in one of these areas (or add your own):

- Animals accidentally harmed by an activity that helps people
- Recreating a natural living environment inside human-made buildings
- Feeding
- Finding the right enrichment activities for a specific animal
- Healing injured or sick animals
- Managing feces
- Natural animal instincts accidentally harming people
- Conserving endangered species
- Transportation

In the ANIMAL ALLIESSM Challenge, an *animal* is any member of the scientific animal kingdom (besides humans) that is currently alive today.



After your team selects a problem, the next step is to find out about the current solutions. Encourage them to research their problem using resources like:

- News articles
- Documentaries or movies
- Interviews with professionals working in the field
- Ask your local librarian
- Books
- Online videos
- Websites



Field trips are a great way to learn about a new topic. Consider requesting a tour or interview from a local business, educational institution, or other animal-related site. However, some locations may have rules restricting visitors, or they may not have someone available to give an interview. If they say “no,” ask about virtual tours online or other institutions you could contact.

After your team selects a problem, find out about the current solutions. Why does this problem still exist? Why aren’t the current solutions good enough? What could be improved?

As a Team – Decide when you feel that you know your team’s animal and problem pretty well. Then, move on to the “Design an Innovative Solution” section.

DESIGN A SOLUTION

Next, your team will design a solution to the problem. Any solution is a good start. The ultimate goal is to design an **innovative** solution that adds value to society by improving something that already exists, using something that exists in a new way, or inventing something totally new.

As a Team – Think about:

- What could be done better? What could be done in a new way?
- Could your solution make people and animals more productive, healthier, or happier?
- How can you reimagine the way we work with or study animals?
- Could you use an adaptation from an existing animal (biomimicry) to help solve the problem you identified?

Ask your team to think of your problem like a puzzle. Brainstorm! Then turn the problem upside down and think about it in a completely different way. Imagine! Get silly! Even a “silly idea” might inspire the perfect solution. Encourage team members to try one idea (or more), but be prepared that the first idea may need some improvements.

Make sure your team thinks about how they could make their solution a reality. Try asking them questions like:

- Why would your solution succeed when others have failed?
- What information would you need to estimate the cost?
- Do you need any special technology to make your solution?
- Who would be able to use it?

Remember, your team’s solution does not need to be completely new. Inventors often improve an idea that already exists or use something that exists in a new way.



A great solution might be a device or technology, but maybe not. Look for the solution that the team thinks will solve the problem best. Team members should be prepared to tell the judges what makes their idea better than the existing solutions.

SHARE WITH OTHERS

Once the team has designed a solution, the next step is to share it!

As a Team – Think about who your solution might help. How can you let them know that you have solved their problem?

- Can you present your research and solution to people who own, sell, or care for animals?
- Can you share with a professional or someone who helped you learn about your problem?
- Can you think of any other groups of people who might be interested in your idea?

It might be helpful for your team to share with someone who could provide real-world feedback about the solution. Getting input and improving are part of the design process for any engineer. It is OK to revise an idea if the team receives some helpful feedback.



When your team plans their presentation, encourage them to use the talents of team members. Teams often explore creative presentation styles, but it is also important to keep the focus on your team's problem and solution. Sharing can be simple or elaborate, serious or designed to make people laugh while they learn.

No matter what presentation style your team chooses, remember to keep the process fun!

The Project Presentation

Any inventor must present their idea to people who can help them make it a reality, such as engineers, investors, or manufacturers. Like adult inventors, the Project presentation is your team's chance to share their great Project work with the Judges.

All regions require teams to prepare a Project presentation. As long as your team covers the basic Project information, they may choose any presentation style they like. Check with your tournament organizer to see if there are any size or noise restrictions in the judging rooms.



Your team's presentation may include posters, slideshows, models, multimedia clips, props, costumes, and more. Creativity in the presentation is rewarded, but covering all of the essential information is even more important.

Teams will only be eligible for Project awards if they:

- Identify a **problem** that meets this year's criteria.
- Explain their **innovative solution**.
- Describe how they **shared with others** prior to the tournament.

Presentation requirements:

- All teams must present **live**. The team may use media equipment (if available) only to enhance the live presentation.
- **Include all team members**. Each team member must participate in the Project judging session.
- Set up and complete the presentation in **five minutes or less** with no adult help.

The teams who excel at tournaments also use the Project presentation to tell the Judges about their sources of information, problem analysis, review of existing solutions, elements that make their idea innovative, and any plans or analysis related to implementation.

Project Resources



FIRST[®] does not control or endorse the content of these external websites. They are provided as optional references only. Please preview all resources based on the maturity level of your team.

VIDEO

Guide dog training – Find out what it means to train and work with a guide dog.

<http://www.wmur.com/new-hampshire-chronicle/thursday-february-12th-guide-dog-training/31315342>

Making peace with lions - Richard Tuere describes his invention to help people and lions live more peacefully together in Kenya.

http://www.ted.com/talks/richard_turere_a_peace_treaty_with_the_lions

WEBSITES AND ARTICLES

Animal Kingdom – See what scientists include in the animal kingdom and find links to more information about specific categories of animals.

<http://www.kidport.com/reflib/science/animals/Animals.htm>

Animal swap – Have you ever thought about what a puffin costs? Find out why many zoos and aquariums trade animals rather than buying them.

<http://n.pr/1pSVVa0>

Biomimicry – What is biomimicry and how can it help you solve problems?

<http://www.asknature.org>

Crittercam – Learn about how National Geographic's Crittercam makes studying animals both more productive and less disruptive for the animals.

<http://animals.nationalgeographic.com/animals/crittercam/>

Delving into Dung – You can learn a lot about animals by studying their poop.

<https://student.societyforscience.org/article/cool-jobs-delving-dung>

Earth Rangers – The Earth Rangers blog posts articles about interesting animals and the problems they face. <http://www.earthrangers.com/wildwire>

Go local – Zoos, aquariums, and animal sanctuaries often provide great resources and programs to learn about animals. Use a search engine to find these animal resources in your area or around the world.

Meet a zoo animal – The Association of Zoos and Aquariums would like to show you how zoos and aquariums work with all sorts of animals.

<http://azaanimals.org>



BOOKS

Scientists in the Field

This series from the publisher Houghton Mifflin contains many books about scientists and other professionals who work with animals. Some examples include:

The Frog Scientist (2011)

The Hive Detectives (2010)

The Octopus Scientists (2015)

Swimming with Hammerhead Sharks (2011)

Wild Horse Scientists (2012)

Wild Animal Neighbors: Sharing Our Urban World

Learn about the conflicts between seven different animals and the people they encounter in cities around the world.

By Ann Downer, Twenty-First Century Books (2014)

Working Like a Dog: The Story of Working dogs through history

Provides many examples of the ways that humans have interacted with dogs throughout history.

By Gena K. Gorrell, Tundra Books (2003)

Ask a Professional

Talking with professionals (people who work in the field of this year's Challenge theme) is a great way for your team to:

- Learn more about this season's theme.
- Find ideas for your ANIMAL ALLIESSM problem.
- Discover resources that might help with your research.
- Get feedback on your innovative solution.

EXAMPLES OF PROFESSIONALS

Consider contacting people who work in the following professions. See if your team can brainstorm any other jobs to add to the list. Many company, professional association, government, and university websites include contact information for professionals.

Job	What they do	Where they may work
animal curator	Manages a collection of animals. May involve planning for animal care, display, enrichment, and acquiring or trading.	Aquariums, zoos, animal refuges
aquarist	Cares for aquatic (water) animals through feeding, training, and generally caring for their wellbeing.	Aquariums, marine research labs, government natural resources departments, theme parks, pet stores
farm manager	Runs a farm that produces crops, livestock, or dairy products.	Farms, universities
game warden	Enforces laws related to fishing, hunting, and owning of wild animals.	Local or national government agencies
herder	Cares for livestock in places where these animals wander through pasture lands.	Farms, ranches, traditional communities, wilderness areas
nutritionist	Uses knowledge about food science to suggest diet options and adjustments for animals.	Zoos, aquariums, pet food companies
rancher	Owens or works on a ranch where livestock are raised.	Ranches
trainer	Trains animals for obedience, performance, riding, or assisting people.	Obedience schools, stables, theme parks, service animal organizations
veterinarian	Provides medical treatment to animals.	Veterinarian's office, farms, aquariums, zoos, stables, pet stores, animal product companies, universities
veterinary technician or veterinary nurse	Works with veterinarians to treat or study animals.	Veterinarian's office, laboratory, university, farm
wildlife rehabilitator	Cares for ill, injured, or orphaned animals until they can be released into the wild. Wildlife rehabilitators require an official license.	Wildlife centers, aquariums, zoos, animal shelters
wildlife biologist	Studies animals and how they interact with their ecosystems.	Universities, government agencies, medical research laboratories, museums, zoos
zookeeper	Cares for captive animals through feeding, training and generally caring for their wellbeing.	Zoos, aquariums, animal refuges, theme parks
zoologist	Studies animals and how they interact with their ecosystems.	Universities, government agencies, medical research laboratories, museums, zoos

WHO DO YOU KNOW?

One of the best recruiting tools for your Project is your own team. **Think about it.** Who do you know? Chances are good that someone knows a professional who works with animals in some way. Ask your team members to think about family, friends, or mentors who work in a job that involves animals.

Refer to the list of professionals on the previous page to help you brainstorm ideas. Think about the people who study, treat, or manage animals. Think about the technology that people use to care for animals. Who makes that technology?

Make a list of people your team might want to interview.

HOW SHOULD YOU ASK?

As a team - talk about your list of professionals and choose one or more who you think could help your team learn about how people interact with animals. Do a little research about each professional. Find out how the person works with this year's theme and think about what questions you might want to ask in an interview.

Next, work with team members to contact the professional you chose. Explain a little about *FIRST*[®] LEGO[®] League and what you are researching this season. Tell the professional about the team's goals and ask if they can interview him or her.

WHAT SHOULD YOU ASK?

Have the team prepare a list of questions for the interview. When you think about questions to ask:

- Use the research the team has already done to brainstorm questions about the professional's area of expertise. It's important to ask questions the person can answer.
- Keep the team's Project goal in mind. Ask questions that will help you learn more about your topic and design an innovative solution.
- Keep questions short and specific. The more direct team members can be, the more likely they are to receive a useful answer.
- Do NOT ask the professional to design an innovative solution for your team. The team's solution must be the work of team members. If you already have an innovative solution though, it is ok for the professional to provide feedback on the idea.

At the end of the interview, ask the professional if your team may contact him or her again. They might think of more questions later. Maybe the person would be willing to meet with your team again or give you a tour. Don't be afraid to ask.

And finally, show your team's Gracious Professionalism[®] during the interview, and remember to thank the professional for his or her time!



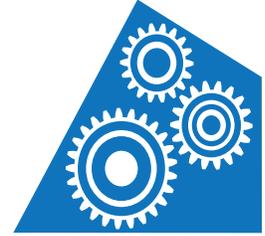
WHERE TO LEARN MORE? VISIT <http://firstlegoleague.org/challenge#animal-allies>

- Find the essential details of the Project in the Challenge.
- Check the Project Updates often. Here *FIRST*[®] LEGO[®] League staff will clarify common questions. Updates supersede anything in this Challenge document and will be in effect at tournaments.
- Learn more about how to approach the Project with your team and read tips from experienced Coaches in the Coaches' Handbook: <http://firstinspires.org/resource-library/fil/coaches-handbook>.
- Your team will be assessed in the judging room using a standard rubric. Review the Project judging information and rubric.
- If you are completely new, check out the *FIRST* LEGO League Resource Library for videos, tips, and additional helpful rookie links: <http://firstinspires.org/resource-library>.



The Robot Game

The Robot Game Rules



GUIDING PRINCIPLES

GP1 – Gracious Professionalism® - You are “Gracious Professionals.” You compete hard against problems, while treating all people with respect and kindness. If you joined *FIRST*® LEGO® League with a main goal of “winning a robotics competition,” you’re in the wrong place!

GP2 – Interpretation

- **If a detail isn’t mentioned, then it doesn’t matter.**
- Robot Game text means exactly and only what it plainly says.
- If a word isn’t given a game definition, use its common conversational meaning.

GP3 – Benefit of the Doubt - If the Referee (Ref) feels something is a “very tough call,” and no one can point to strong text in any particular direction, you get the Benefit Of The Doubt. This good-faith courtesy is not to be used as a strategy.

GP4 - Variability - Our suppliers and volunteers try hard to make all Fields correct and identical, but you should always expect little defects and differences. Top teams design with these in mind. Examples include Border Wall splinters, lighting changes, and Field Mat wrinkles.

GP5 - Information Superiority - If two official facts disagree, or confuse you when read together, here’s the order of their authority (with #1 being the strongest):

#1 = Current Robot Game **UPDATES**

#2 = **MISSIONS** and **FIELD SETUP**

#3 = **RULES**

#4 = **LOCAL HEAD REF** - In unclear situations, local Head Referees may make good-faith decisions after discussion, with Rule GP3 in mind.

- Pictures and video have no authority, except when talked about in #1, #2, or #3.
- Emails and Forum comments have no authority.

DEFINITIONS

D01 - Match - A “Match” is when two teams play opposite each other on two Fields placed north to north.

- Your Robot **LAUNCHES** one or more times from Base and tries as many Missions as possible.
- Matches last 2-1/2 minutes, and the timer never pauses.

D02 - Mission - A “Mission” is an opportunity for the Robot to earn points. Missions are written in the form of requirements.

- Most are **results** that must be visible to the Ref at the **end of the match**.
- Some are **actions** that must be watched/approved by the Ref **as they happen**.
- If a Mission has any “more” requirements, they must all be met, or the whole Mission scores zero.

D03 - Equipment - “Equipment” is everything you bring to a Match for Mission-related activity.

