

FIRST 2026

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FIRST **AGE** PRESENTED BY
Qualcomm

COACHING BEYOND THE ROBOT

Leading Robotics Teams with
Structure, Clarity, and Heart



LEANNE R. JENSEN, PhD

Beyond the Robot:

Engineering Thinking That Lasts A Lifetime

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PRESENTER BIO



LEANNE R. JENSEN, PhD

Human Systems Integration | Systems Engineering | Human Performance
SYSTEMS THINKER. ENGINEER. MENTOR. EDUCATOR.



Expert in **Human Systems Integration**, with a focus on the intersection of humans, systems, and technology.



Passionate about developing future engineers and leaders who **design with empathy**, think in systems, and solve complex problems.



Alumna of **Michigan Technological University** with degrees in Mechanical Engineering Technology, Instructional Design, and a PhD in Education (Training & Human Performance).



FIRST mentor and coach, empowering student teams to innovate, collaborate, and grow through hands-on learning and real-world challenges.



SYSTEMS
ENGINEERING
EXPERTISE



INNOVATION
THROUGH
PEOPLE



HUMAN-CENTERED
SOLUTIONS

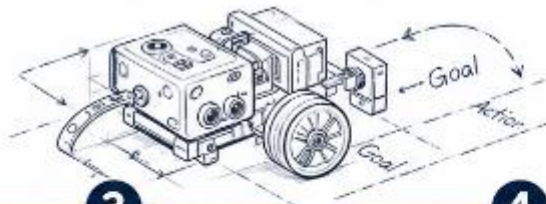


MENTOR.
SPEAKER.
EDUCATOR.

“ *Inspiring the next generation of engineers to think boldly, build wisely, and lead with purpose.* ”



AGENDA



Systems Thinking in Action

1

OPENING: SYSTEMS MOMENT



- Competition Day Reality
- When "failure" reveals the system
- What is the real product of FIRST?

2

ROBOT DESIGN & PERFORMANCE



- Constraints & Requirements
- Trade-offs & Integration
- Reliability & Testing
- Iteration & Improvement

3

INNOVATION PROJECT (HUMAN-CENTERED SYSTEM)



- Problem Framing
- Stakeholders & Context
- Designing Solutions for Real Use
- Impact & Feedback

4

SYSTEMS THINKING & LASTING IMPACT



- Technical + Human Systems
- Learning Through Iteration
- Transfer Beyond FIRST
- Coaches Shape the Environment



THE REAL PRODUCT:
HOW STUDENTS LEARN TO THINK.



A MOMENT WE ALL KNOW...

It's competition day.

Your team has spent weeks—sometimes months—designing, building, testing, and refining your robot. The countdown begins. The match starts.

And then... something goes wrong.



Maybe the robot **misses a mission** it had completed dozens of times in practice.



Maybe it veers **off course** and never recovers.



Or maybe, in the most frustrating case, it **simply doesn't move** at all.



In that moment, you can feel the shift. The energy changes. Students look at the robot, then at each other, and sometimes, they look at you.

And it feels like failure.



But I want to offer a **different way** to see that moment.



SPIKE™ Prime*
Built to learn.
Designed to inspire.



Because what is happening here is **not just a robotics problem.**

It is not simply a **performance issue.**

It is a **SYSTEMS MOMENT.**

And it leads to the question I want to center us on today:

WHAT IS THE REAL PRODUCT OF FIRST?

*Is it the robot?
Or is it something else?*





ATLAS ★
Built to learn.
Designed to inspire.

FIRST TEAMS BUILD ROBOTS, BUT THE REAL PRODUCT IS HOW STUDENTS LEARN TO THINK.



The robot is what we see.
It is measured.
It is scored.



The thinking behind it
is what lasts long
after the season ends.



Two domains.
One mission:
better thinkers,
better together.

TWO DISTINCT BUT DEEPLY CONNECTED DOMAINS

ON THE FIELD: ROBOT GAME
DESIGN & EXECUTE A TECHNICAL SYSTEM

- Design
- Build & Program
- Test & Iterate
- Compete



OFF THE FIELD: INNOVATION PROJECT
SOLVE REAL-WORLD PROBLEMS

- Identify Problem
- Understand Stakeholders
- Design Solutions
- Make an Impact



If the outcome we care about is thinking...

COACHING SHAPES THINKING

EASY

Celebrate the score.



VS.

POWERFUL

Seek the understanding.

What changed that made that more reliable?

What did you learn from the last run that helped this one?



















We shift the focus from performance to understanding.

That's where **systems thinking** takes root.

FIRST LEGO League Pillars → Real-World Engineering Skills

How FLL Develops Engineers, Innovators, and Team Leaders

Pillar	Focus Area	What Teams Learn	Real-World Connection
 Robot Performance	 Designing & programming an autonomous robot to complete missions.	 Designing & programming an autonomous robot to complete missions.	 Mirrors engineering test cycles used in aerospace, robotics, and autonomous systems.
 Innovation Project	 Researching a real problem, designing a solution, and sharing with others.	 Critical thinking, research literacy, creativity, and communication.	 Reflects R&D pipelines, user-centered design, and scientific inquiry.
 Robot Design	 Explaining robot architecture, attachments, and code.	 Engineering design, documentation, reliability, and trade studies.	 Similar to design reviews in industry.
 Core Values	 Discovery, Innovation, Impact, Inclusion, Teamwork, Fun	 Collaboration, empathy, leadership, resilience, and ethical behavior.	 Builds the same interpersonal foundations seen in high-performing engineering teams.



Built on four pillars.



Driven by values.



Powered by people.

=



A better future.

THE FOUR PILLARS of FIRST LEGO LEAGUE


(Featuring the FLL Chicken)



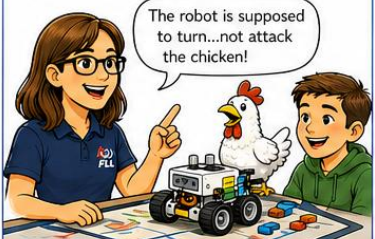
Alright, team!
Let's talk about the four pillars of the FIRST LEGO League—and one very helpful chicken!

★ Four pillars. One unforgettable season. And one **very** committed chicken.


PILLAR 1: ROBOT GAME
Systems thinking



The robot is supposed to turn...not attack the chicken!



Iterate, test, adjust... preferably without endangering poultry.



PILLAR 2: INNOVATION PROJECT
Identify a problem



No, the problem can't be "I get hungry"


Ba-Gawk!



Identify a problem, then improve the world... or at the barnyard.

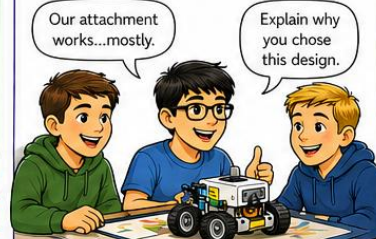


PILLAR 3: ROBOT DESIGN
Document, justify, refine




Our attachment works...mostly.

Explain why you chose this design.



Document your ideas, justify your choices, and refine for better results.



PILLAR 4: CORE VALUES
Discovery, innovation, inclusion, teamwork, impact, and fun



We've got this. Let's fix it together.

That's teamwork!



Lead with our values. That's what makes everything possible.




★ Built on four pillars. • Driven by values. • Powered by people. = ♥ A better future.

THE FLL SEASON AS ENGINEERING



THEME ANNOUNCED

Teams receive the challenge and begin understanding the wider landscape, constraints, and opportunities.



RESEARCH BEGINS

Teams investigate, interview experts, and narrow down what matters most.



PROTOTYPING STARTS

Ideas become tangible. Teams test, refine, and embrace failure as data.



DESIGN MATURES

Robot, code, and innovation ideas take shape as components begin to work together.



PRESENTATIONS DEVELOP

Teams learn to explain why their decisions work, not just what they built.



SYSTEMS CONTEXT

Teams receive the challenge and begin understanding.



PROBLEM FRAMING

Teams investigate, interview experts, and narrow down what matters most.



ITERATIVE TESTING

Ideas become tangible. Teams test, refine.



INTEGRATION & REFINEMENT

Integration & Refinement as components begin to work together.



SYSTEM PERFORMANCE UNDER REAL CONSTRAINTS

Everything comes together.

COACHING SHAPES SYSTEMS THINKING

We don't just help students build better robots.
We help them think in systems.

Instead of guiding toward the "best" solution, we can ask...



**POWERFUL QUESTIONS
BUILD POWERFUL THINKERS**

-  What are we **GAINING** with this approach?
-  What are we **RISKING**?
-  If this **FAILS**, what happens **NEXT**?

When students think this way...



Students aren't just building.
*They're learning to **THINK LIKE ENGINEERS.***

THE SYSTEMS ENGINEERING “V”

A roadmap for building the right solution—and proving it works.

We start with the *need*...

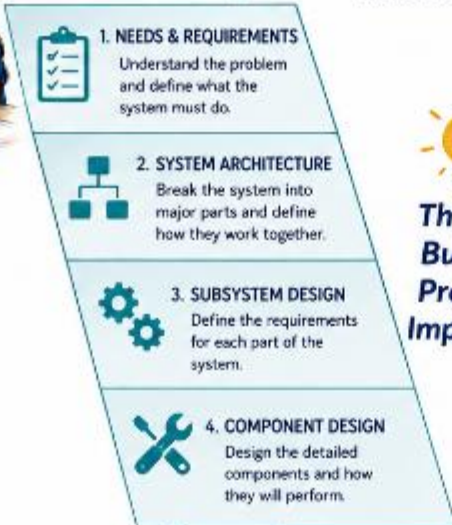


We define the solution.
Break the big problem down into smaller, manageable pieces.



★ WHY THIS MATTERS
It helps teams think ahead, make smart decisions, and build solutions that work in the real world.

DECOMPOSITION (Define the Solution)

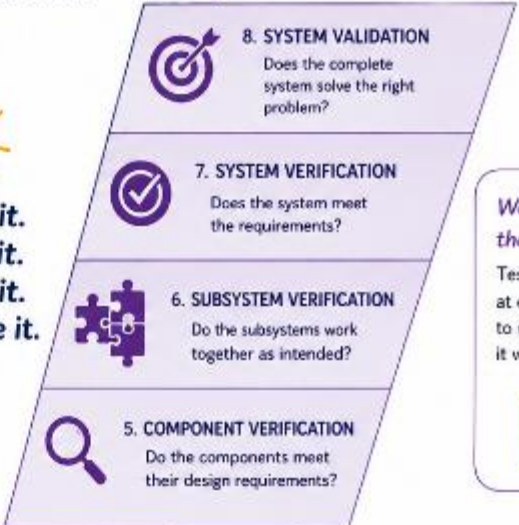


PLAN & UNDERSTAND What problem are we solving? What does success look like?



**Think it.
Build it.
Prove it.
Improve it.**

INTEGRATION & VERIFICATION (Prove the Solution)




We prove the solution.
Test and verify at every level to make sure it works.



Test early.
Test often.
Learn always.



Great solutions come from a cycle of understanding, building, testing, and improving.
That's engineering. That's systems thinking. That's FIRST.

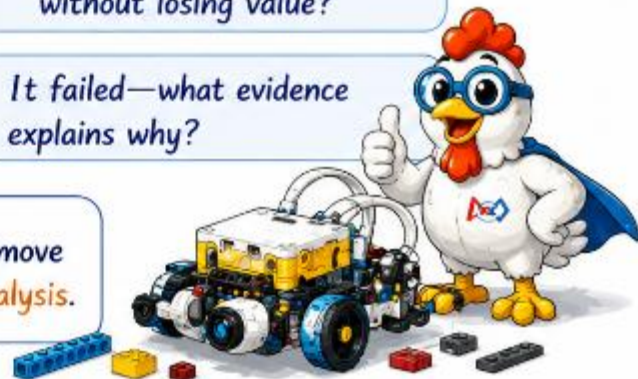



TEACHING SYSTEMS THINKING

FROM IMPULSIVE ACTION → TO SYSTEMS THINKING



Strategic thinking emerges when students move from impulsive decisions to **evidence-based analysis**.



THE FIRST ROBOT BUILDS ARE ABOUT LEARNING, NOT PERFORMANCE

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FAILURE:

The "F-Word" is the Key to Learning!

- Test Assumptions
- Observe & Adjust
- Learn from Mistakes



EARLY BUILDS MESSY TESTS



It's **OK** to **FAIL!**



That Comes **LATER!**

FAILURE is HOW WE LEARN!
FAIL IT 'TIL YOU NAIL IT!

DESIGNING FOR HUMANS, NOT JUST ROBOTS

A robot can be mechanically brilliant and still fail because the team cannot operate it reliably at competition.



SHARING WORK THROUGH WEBPAGES & PORTFOLIOS

- Document your process
- Share ideas & successes
- Explain design choices & tradeoffs
- Track versions & improvements
- Help future teams



RELIABILITY IS A HUMAN-SYSTEM PROPERTY



KEY PRINCIPLE: If a design requires calm to work, it will not work at competition.

EASE OF USE
Can anyone run this?

CLARITY
Can we see problems instantly?

RECOVERY
Can we recover without panic?

ELEVATE EVERY VOICE



CORE VALUES IN ROBOT DESIGN
Core Values guides are decisions, teamwork, and culture
Core Values guides are decisions, teamwork, and culture at the table.



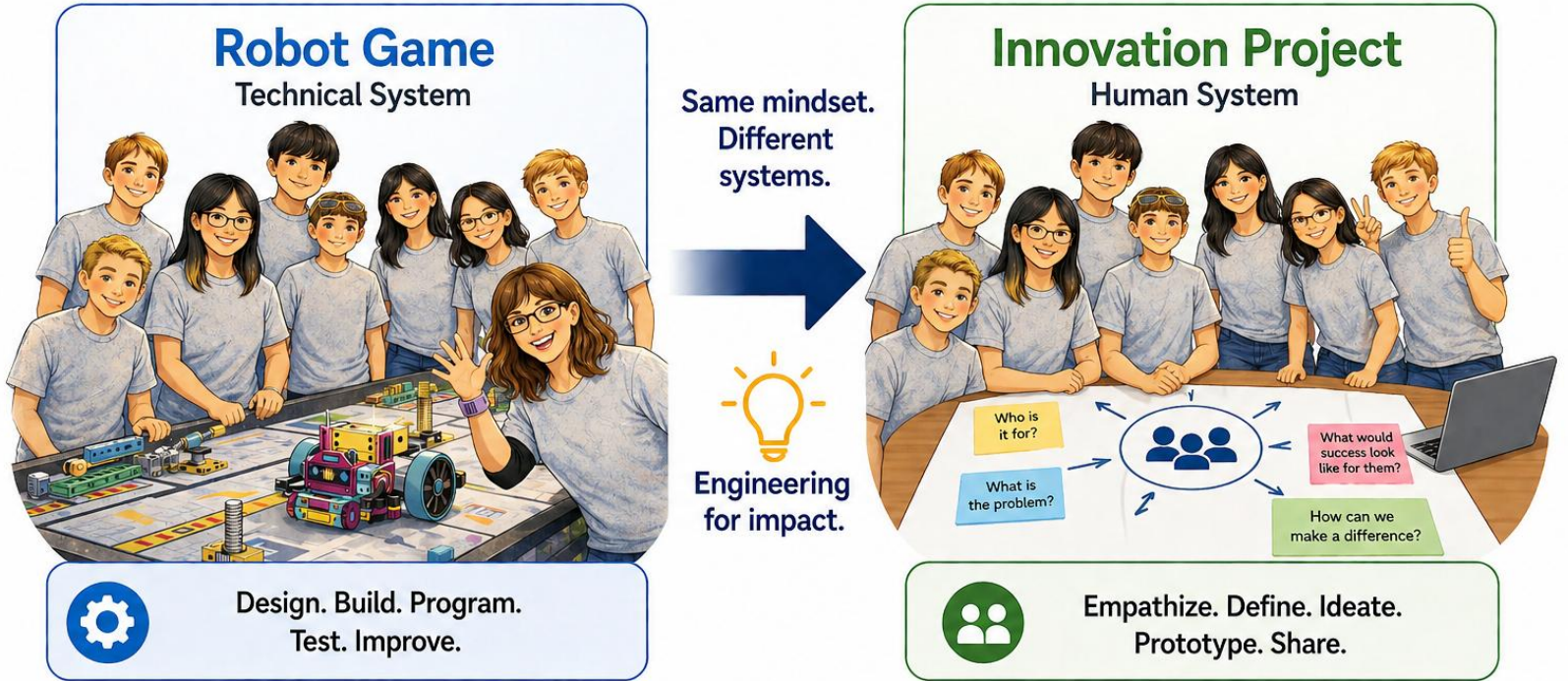
DESIGN AS CULTURE



DESIGNING FOR REAL HUMAN CONDITIONS IS ENGINEERING MATURITY.

Shifting the Focus

From the Robot to Real-World Impact



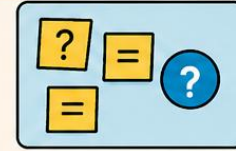
Different systems. Same mindset. Engineering for impact.

The 5 Steps of Human-Centered Problem Solving

1

Begin Broadly and Let Curiosity Lead

Start with natural interests. If a group explores archaeology, ocean exploration, or a favorite hobby, don't rush to find a problem.



Curiosity Board

2

Identify Who Is Actually Affected by the Problem

Imagine specific individuals within the topic, exploring when where.



User Snapshot

3

Clarify the Context Where the Problem Occurs

Explore when and where challenges show up.



Context Walkthrough

4

Gather Evidence That the Problem Truly Exists

Explore issues through research.

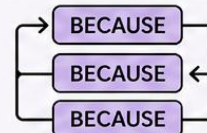


Team Research Journal

5

Articulate Why the Problem Matters

Understanding the impact of inaction.



Because Map

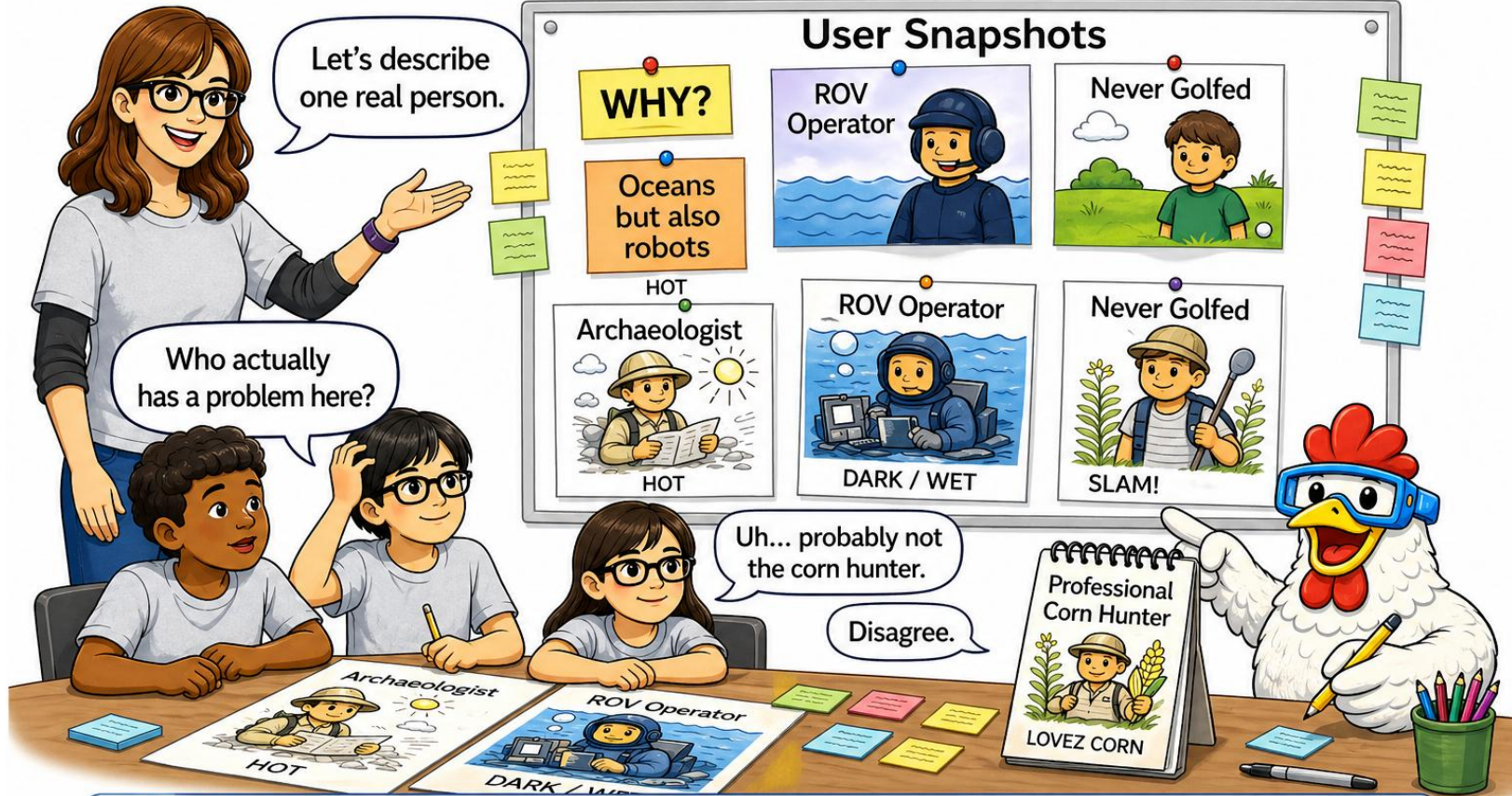
Begin Broadly & Let Curiosity Lead

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 **Step 1: Curiosity creates space for surprise and discovery.**

Identify Who Is Actually Affected



 **Step 2:** Innovation begins with empathy.

Clarify the Context Where the Problem Occurs



1 Kneeling



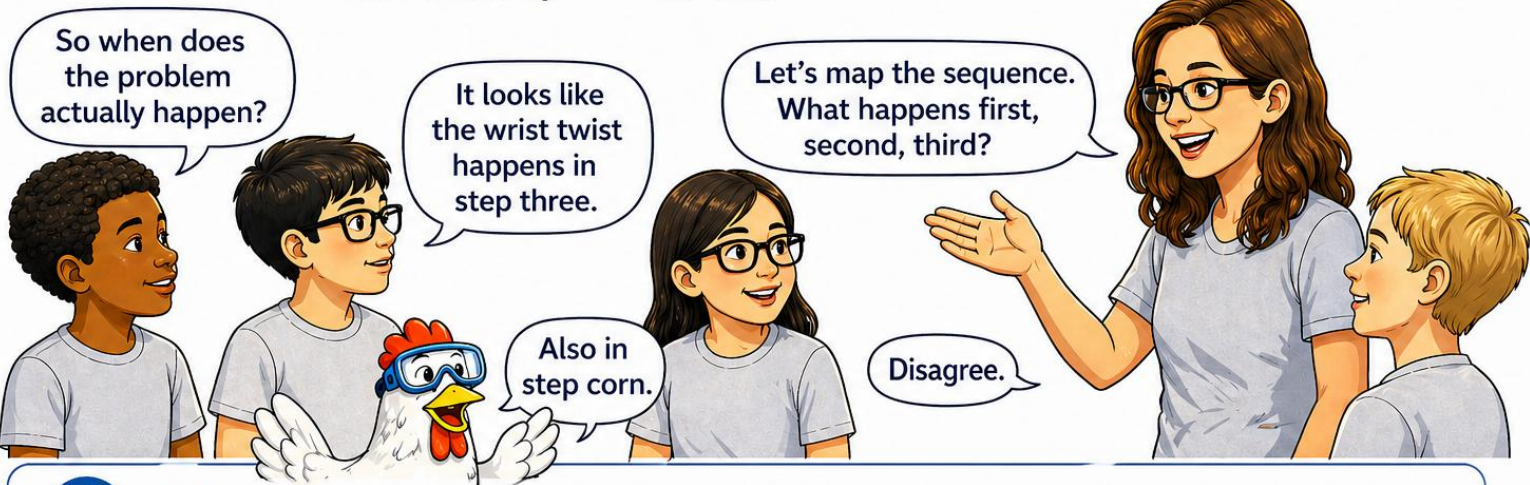
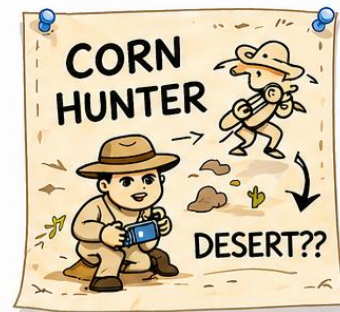
2 Reaching/
twist awkwardly



3 Brushing
dirt with



4 Ow...



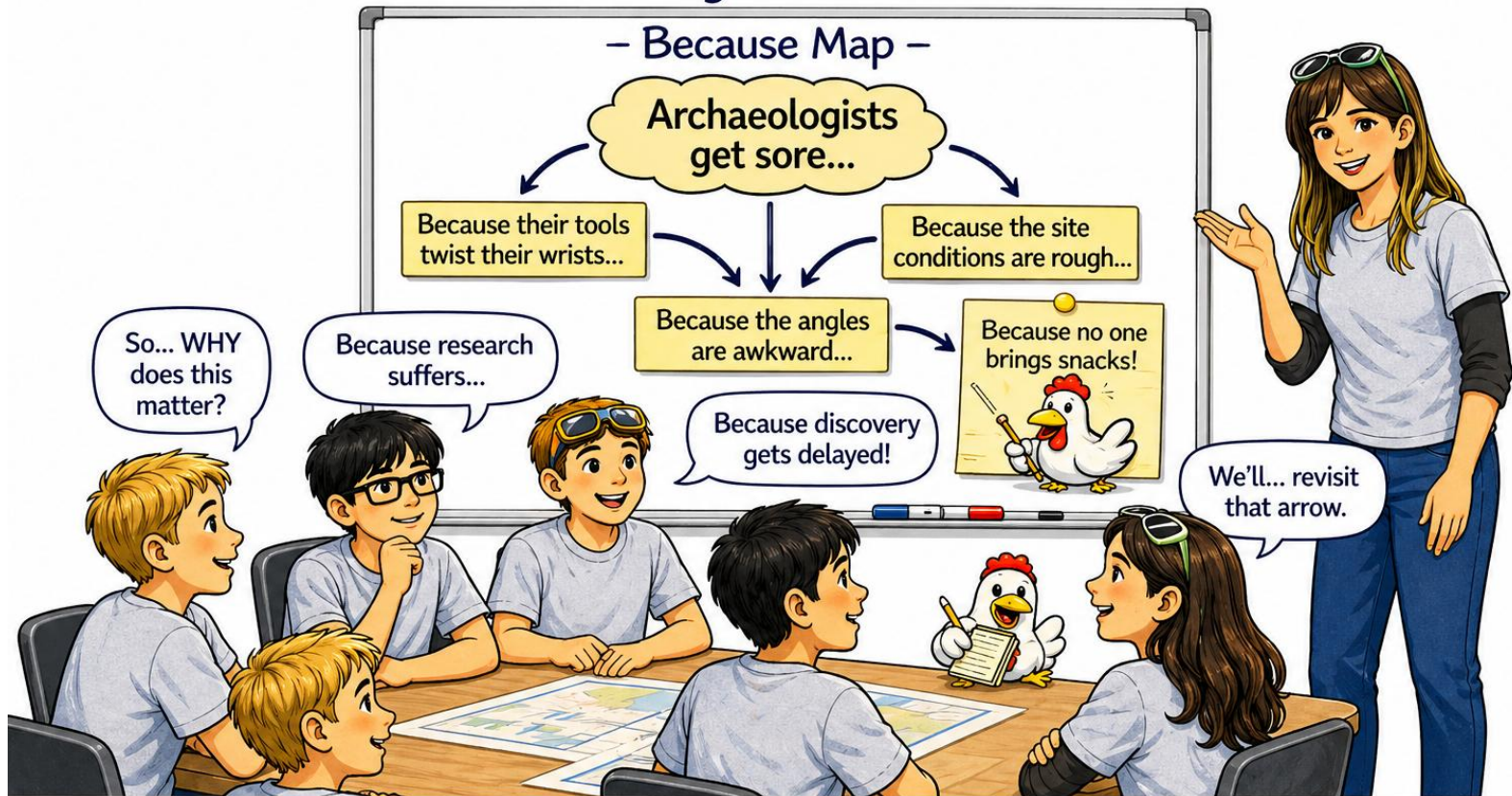
Step 3: Understanding context reveals where problems truly occur.

Gather Evidence That the Problem Exists



Step 4: Evidence makes the project real — research fuels understanding.

Articulate Why the Problem Matters



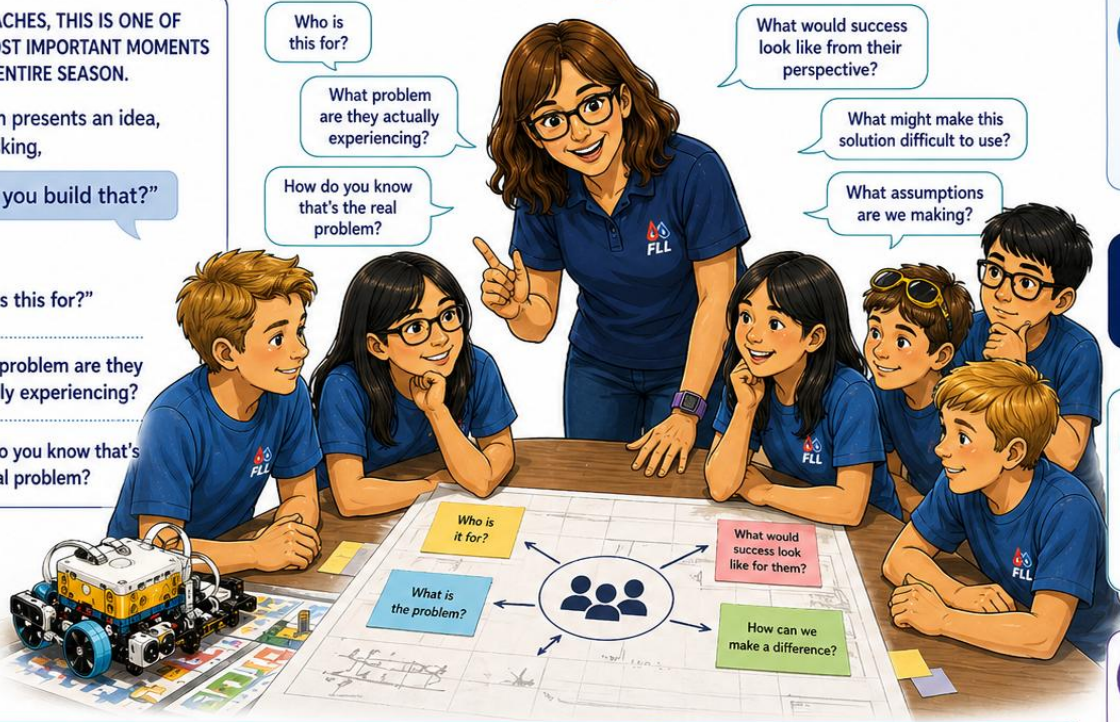
Step 5: Impact clarifies purpose and strengthens the solution.

Human Centered Design

★ AS COACHES, THIS IS ONE OF THE MOST IMPORTANT MOMENTS IN THE ENTIRE SEASON.

When a team presents an idea, instead of asking, "How will you build that?" we can ask:

- ? Who is this for?"
- ? What problem are they actually experiencing?
- ? How do you know that's the real problem?



⌚ THESE QUESTIONS SLOW THE TEAM DOWN IN THE BEST POSSIBLE WAY.

They shift the work from *creativity alone...*

⚙️ TO GROUNDED REASONING.

🌐 NOW STUDENTS ARE NOT JUST DESIGNING IDEAS.

They are designing systems that must function in the real world.

⚡ THIS IS WHERE SOMETHING POWERFUL HAPPENS.

Students begin to realize that a technically "good" solution can still fail—if it does not fit within the human system it is meant to serve.

THEY BEGIN TO CONSIDER:

- USABILITY** (Person icon): Is it easy and intuitive for people to use?
- ADOPTION** (Group of people icon): Will people be willing to use it?
- CONTEXT** (Globe icon): Does it fit the environment, culture, and circumstances?
- BEHAVIOR** (Head with heart icon): Does it support the way people think and act?

Core Values Drive Better Solutions



When we design with people in mind,
our values shape the systems we create.

We're not just
building a robot.
We're improving
lives.

OUR CORE VALUES IN ACTION



INCLUSION

We bring in diverse perspectives.

Inclusion becomes a design strength.



TEAMWORK

We align ideas into a coherent system.

Teamwork becomes integration.



IMPACT

We measure success by the difference we make.

Impact becomes the ultimate measure of success.



Students begin to understand something essential:
Engineering is not just about building things.
It is about improving lives.



DESIGN WITH
EMPATHY



COLLABORATE
WITH PURPOSE



SOLVE FOR
REAL-WORLD
NEEDS



CREATE
LASTING
IMPACT



VALUES GUIDE OUR PROCESS. → SYSTEMS THINKING MAXIMIZES OUR IMPACT.

Two Pathways. One Way of Thinking.

FROM THE ROBOT, STUDENTS LEARN:

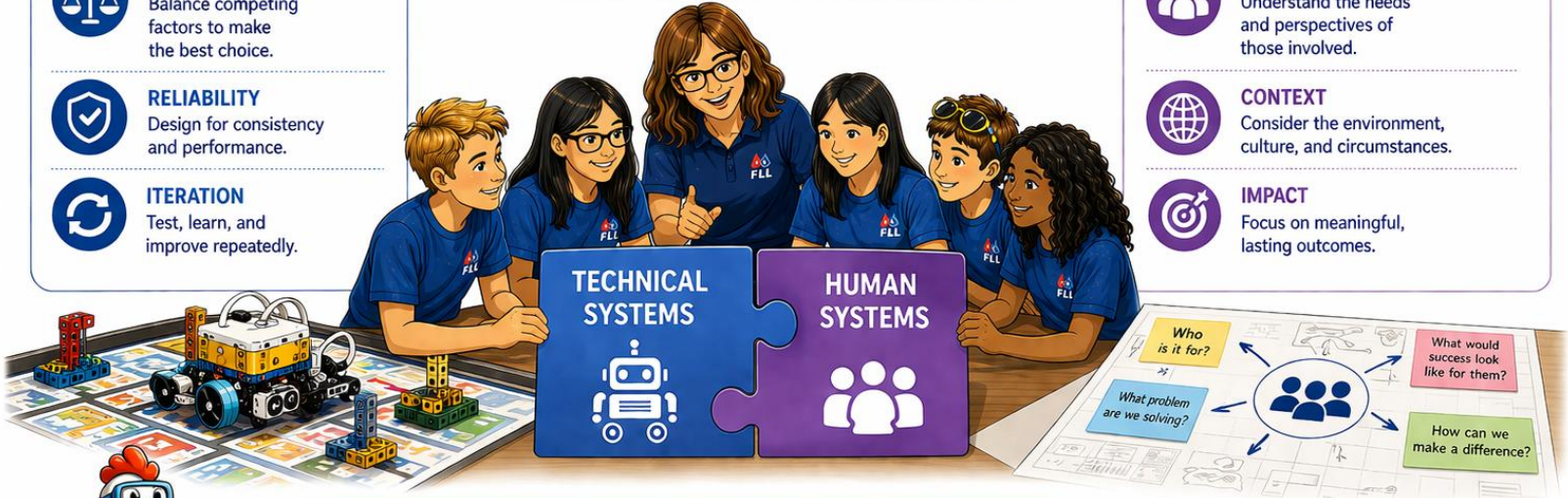
- CONSTRAINTS**
Work within rules, limits, and requirements.
- TRADE-OFFS**
Balance competing factors to make the best choice.
- RELIABILITY**
Design for consistency and performance.
- ITERATION**
Test, learn, and improve repeatedly.

When we step back, something becomes clear.
The robot game and the Innovation Project
are not separate experiences.
They are two expressions of the same
underlying capability:

SYSTEMS THINKING

FROM THE INNOVATION PROJECT, THEY LEARN:

- PROBLEM FRAMING**
Define the right problem to solve.
- STAKEHOLDER AWARENESS**
Understand the needs and perspectives of those involved.
- CONTEXT**
Consider the environment, culture, and circumstances.
- IMPACT**
Focus on meaningful, lasting outcomes.



**TOGETHER, THESE FORM A COMPLETE PICTURE.
TECHNICAL SYSTEMS... AND HUMAN SYSTEMS.**

+ = **BETTER SOLUTIONS. BETTER LIVES.**

The Journey. The Mindset. The Impact.

We don't just build robots.

We build capable, compassionate problem solvers
who think in systems and lead with purpose.

Two paths.
One mindset.
Infinite impact.



WHAT WE'VE LEARNED TOGETHER



SYSTEMS THINKING

Seeing the big picture.
Understanding how parts work together.



HUMAN CENTERED DESIGN

Starting with people.
Designing for real impact.



ITERATION & GROWTH

Testing, learning, and improving—again and again.



CORE VALUES

Inclusion. Teamwork.
Impact. Fun.
Discovery. Innovation.
At the heart of everything.

WHAT WE CREATE TOGETHER



BIGGER THINKERS

Students who ask better questions and seek deeper understanding.



BETTER SOLUTION BUILDERS

Students who create solutions that work in the real world.



MORE IMPACT

Solutions that improve lives and communities.



STRONGER LEADERS

Students who collaborate, communicate, and lead with empathy.



A BETTER FUTURE

Because of the difference they choose to make.

TECHNICAL SYSTEMS



- Constraints
- Trade-offs
- Reliability
- Iteration

COMPLETE PICTURE

Better Solutions.
Stronger Impact.

HUMAN SYSTEMS



- Problem Framing
- Stakeholders
- Context
- Impact



The competition may come and go.
The mindset lasts forever.



When students think in systems,
design with heart, and lead with values...
They change the world.



BUILDING ROBOTS. THINKING IN SYSTEMS. → CREATING A BETTER FUTURE.

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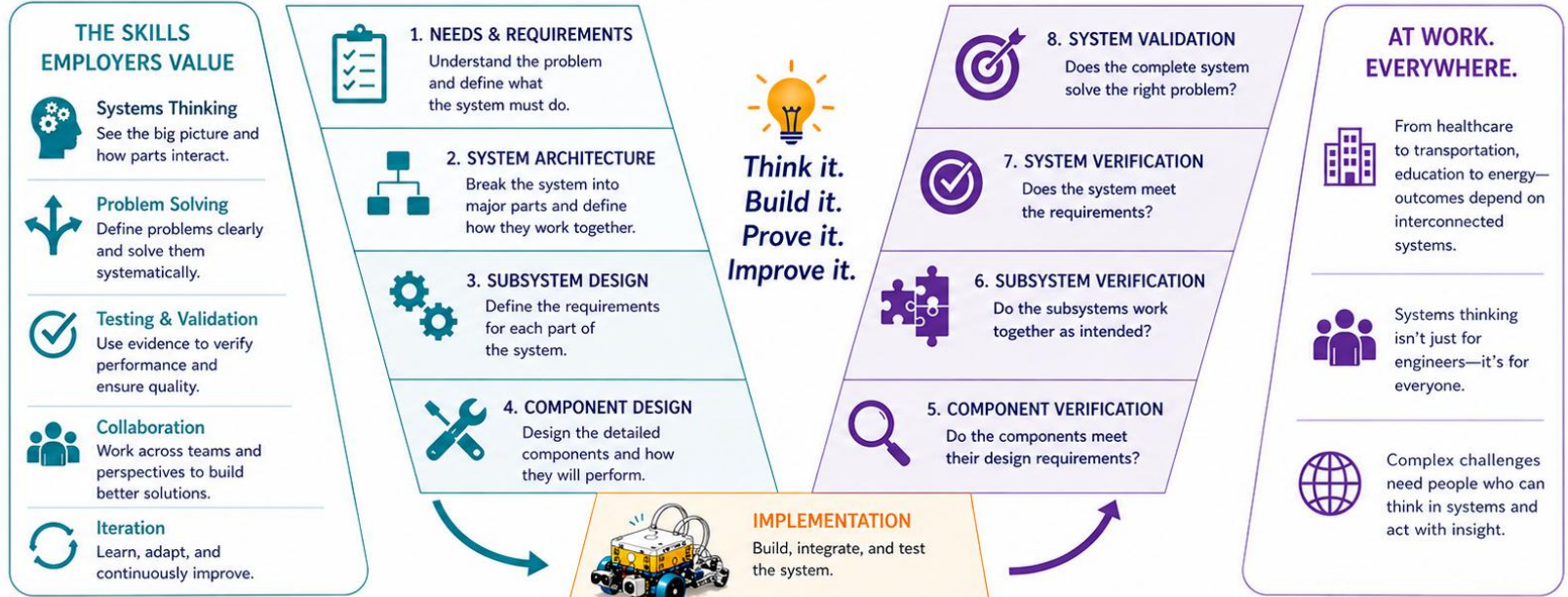
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SYSTEMS ENGINEERING AT THE HEART OF FIRST

FIRST builds more than robots. It builds the systems thinkers our world needs.



FIRST doesn't just introduce students to systems engineering—it builds the mindset and skills to thrive in any field.

Understand complexity. Make smart decisions. Create meaningful impact. That's the power of FIRST.



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THANK YOU!

THE HEART OF COACHING

HOW CARING LEADERSHIP SHAPES COURAGEOUS LEARNERS



Coaching a **FIRST**® team is about showing up with curiosity, patience, and humility.

What it means to be a coach:



Guides learning



Models resilience



Designs routines



Protects team culture



Champions psychological safety



The hardest coaching work happens  when no one sees. 



COACHES *inspire* today.

STUDENTS *lead* tomorrow. 

COACHING BEYOND THE ROBOT

Leading Robotics Teams with
Structure, Clarity, and Heart



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Leanne Jensen

Engineering performance where
humans and intelligent systems thrive...



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