

SAMPLE LESSON · CASE STUDY

# Can AI Fix Recycling?

A look inside a World Science Academy research session — turning a real-world question into award-winning research.



## TODAY'S CHALLENGE

**The recycling industry faces a worker shortage, high contamination, and rising costs.**

**Can AI solve all three at once — and who wins or loses?**

### BY THE END, STUDENTS CAN

- ✓ Evaluate AMP's impact across labor, quality, and efficiency
- ✓ Explain how computer vision, ML, and robotics work together
- ✓ Weigh the tradeoff between automation and jobs



## THE TECHNOLOGY

# AMP Smart Sortation™

A Colorado AI company reinventing how recyclables are sorted — three technologies in one system that learns as it works.

- 1 **Computer vision + ML** identify each material
- 2 **Robotic arms** sort at 3–5× the speed of manual labor
- 3 **Neuron™ AI** reaches up to **98% material purity**

## HOW IT WORKS

# A system that learns as it works



### Capture

A camera sees each item on the moving belt.



### Identify

Neuron™ AI classifies the material in milliseconds.



### Sort

A robotic arm picks and places it in the right stream.



### Learn

Every sorted item feeds back and makes the AI smarter.

Every sorted item makes the model better — a system that improves the more it runs.



## KEY CONCEPTS

# The language students build

## Computer vision

Teaching a machine to "see" and recognize objects from images.

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## Machine learning

A model that improves its predictions from data over time.

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## Contamination rate

The share of non-recyclable material mixed into a batch — lower is better.



## HOW THIS SESSION RUNS

# Students do, not just listen

### In-Person

Real-time polling · Think-Pair-Share · live dataset analysis · case-study debates  
(RDS Virginia · Cortex)

### Online

Social annotation of AMP cases · micro-module self-checks · small-group pods ·  
scenario-based simulations

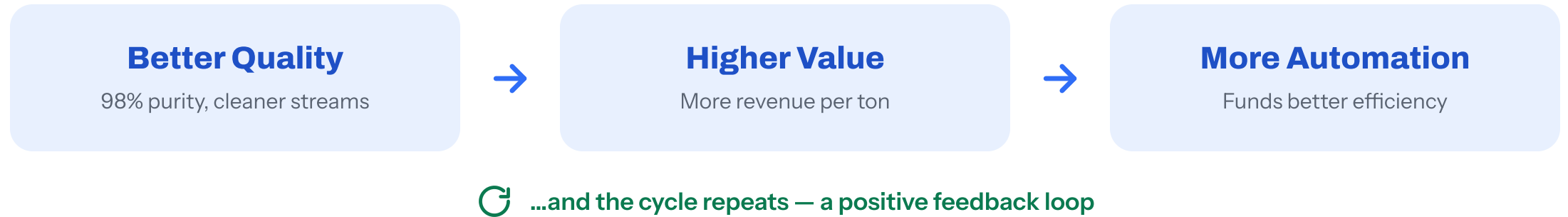
# The Data: Three Impacts

🕒 2:00

| Dimension  | Before — manual sorting                    | With AMP Smart Sortation™                    |
|------------|--------------------------------------------|----------------------------------------------|
| Labor      | High turnover, unfilled roles, injury risk | Fewer manual roles; safer, higher-skill work |
| Quality    | High contamination, low material value     | Up to 98% purity, higher recyclable value    |
| Efficiency | Lower recovery, high cost per ton          | Higher recovery, lower cost/ton, better ROI  |

💡 **Discuss:** Which impact matters most — and to whom? What tradeoff does automation create? What data would prove AMP is worth it?

# The three impacts reinforce each other



Labor, quality, and efficiency don't act alone. Students learn to trace how one gain drives the next.

# What Are We Optimizing?

## Efficiency & Profit

Lower cost per ton

Higher recovery volume

Faster return on investment

## Jobs & Equity

Worker retraining

A fair transition

Community impact

 If a machine sorts 5× faster, what happens to the workers — and who should decide?



## FROM LESSON TO COMPETITION

# One case study → a competition-ready project

By the end of the program, every student produces:



### Research paper

8–12 pages



### Abstract

250–300 words



### Poster

Physical / digital



### Oral & Q&A

Presentation skills

Ready for IAS STS — Indiana Academy of Science



## WRAP-UP

# What students leave with

### Today's takeaway

AI can make recycling cleaner and cheaper — but the labor tradeoff is real, and worth studying.

### Next session

How do we measure and compare these impacts with real numbers — purity %, cost/ton, ROI?



WORLD SCIENCE ACADEMY

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