BUILT FOR THE MINE

Quarry of the Future Forum

March 3, 2025

Virginia Tech

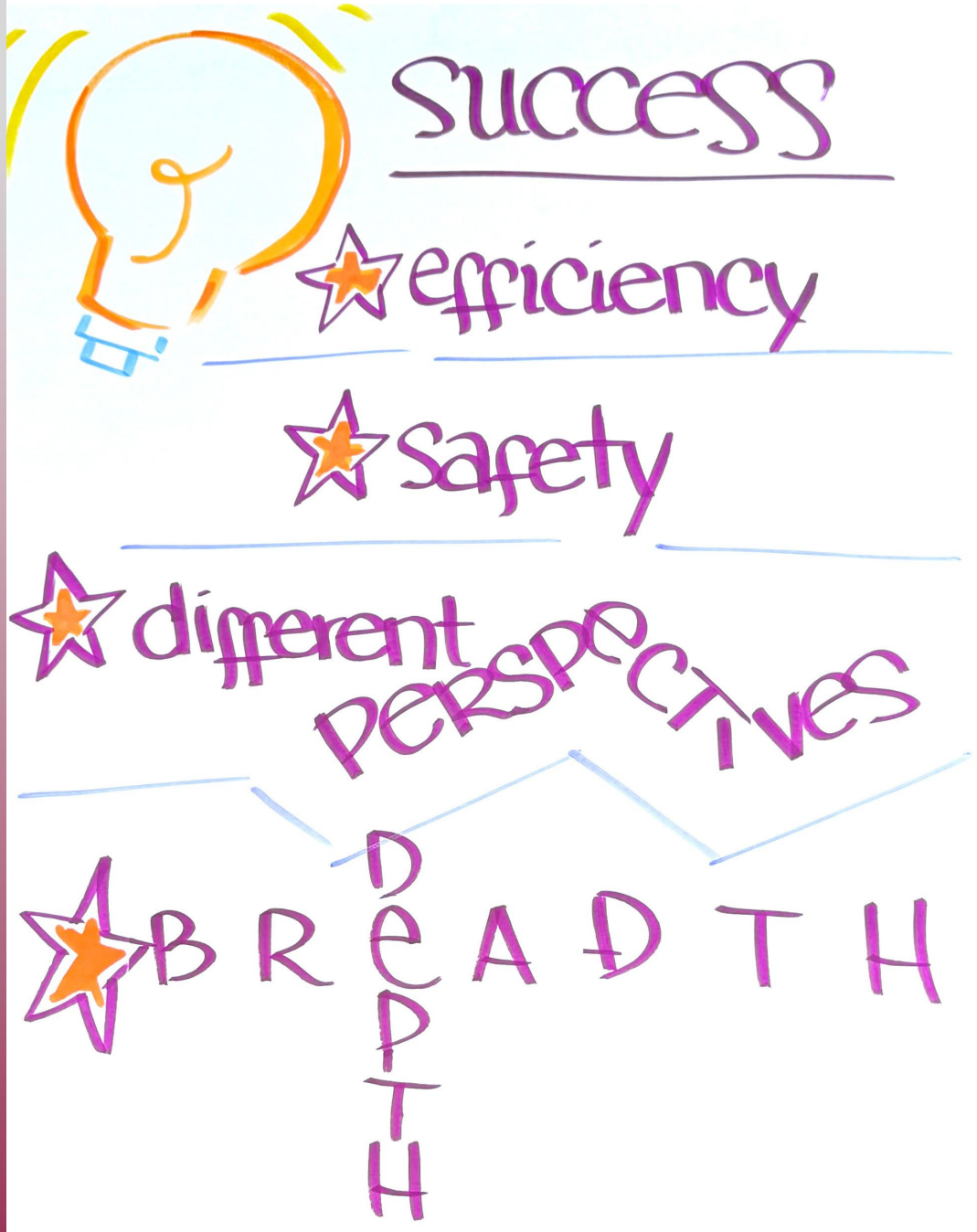
Take a step into the future of the aggregates industry at the "Quarry of the Future" Forum, where we discussed technology changes and anticipated what is to come.

Hosted by **Built For The Mine**, this event was designed to inspire forward-thinking professionals to anticipate and embrace technology and industry evolution.

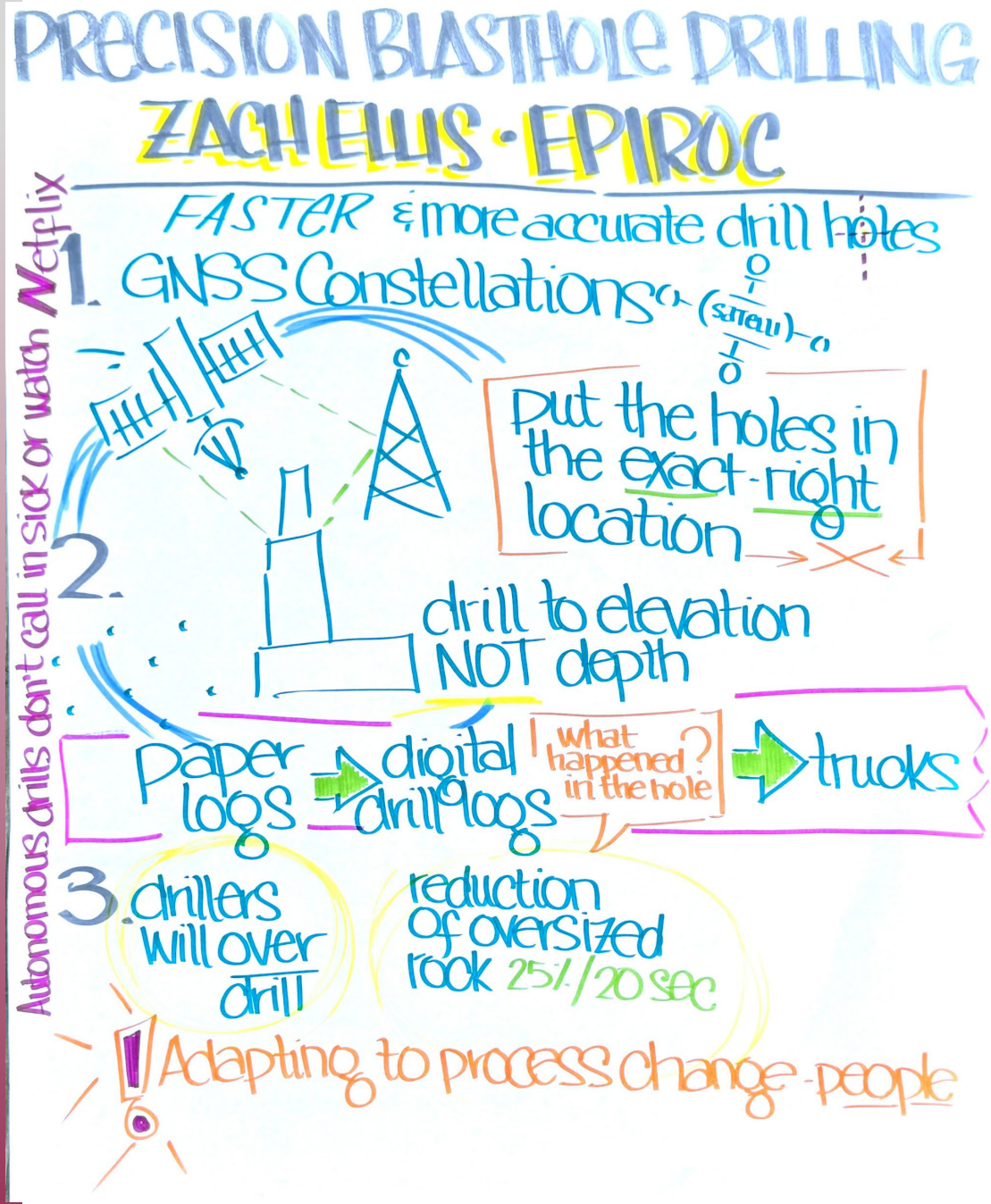
The Forum had more than 60 attendees from nearly 40 companies.

These visual notes are intended to organize and capture the information that was shared.

Forum Objective



Precision Blasthole Drilling



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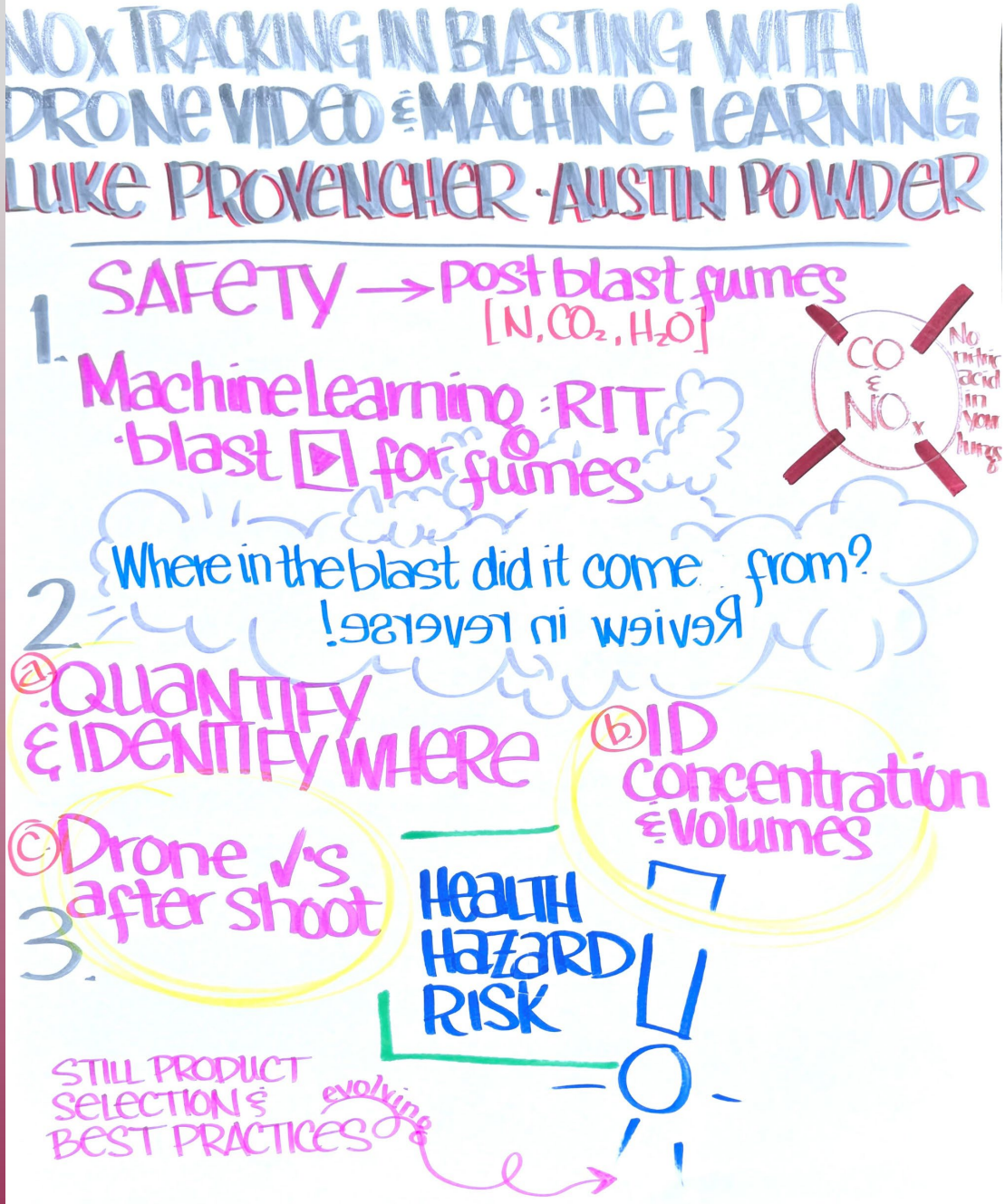
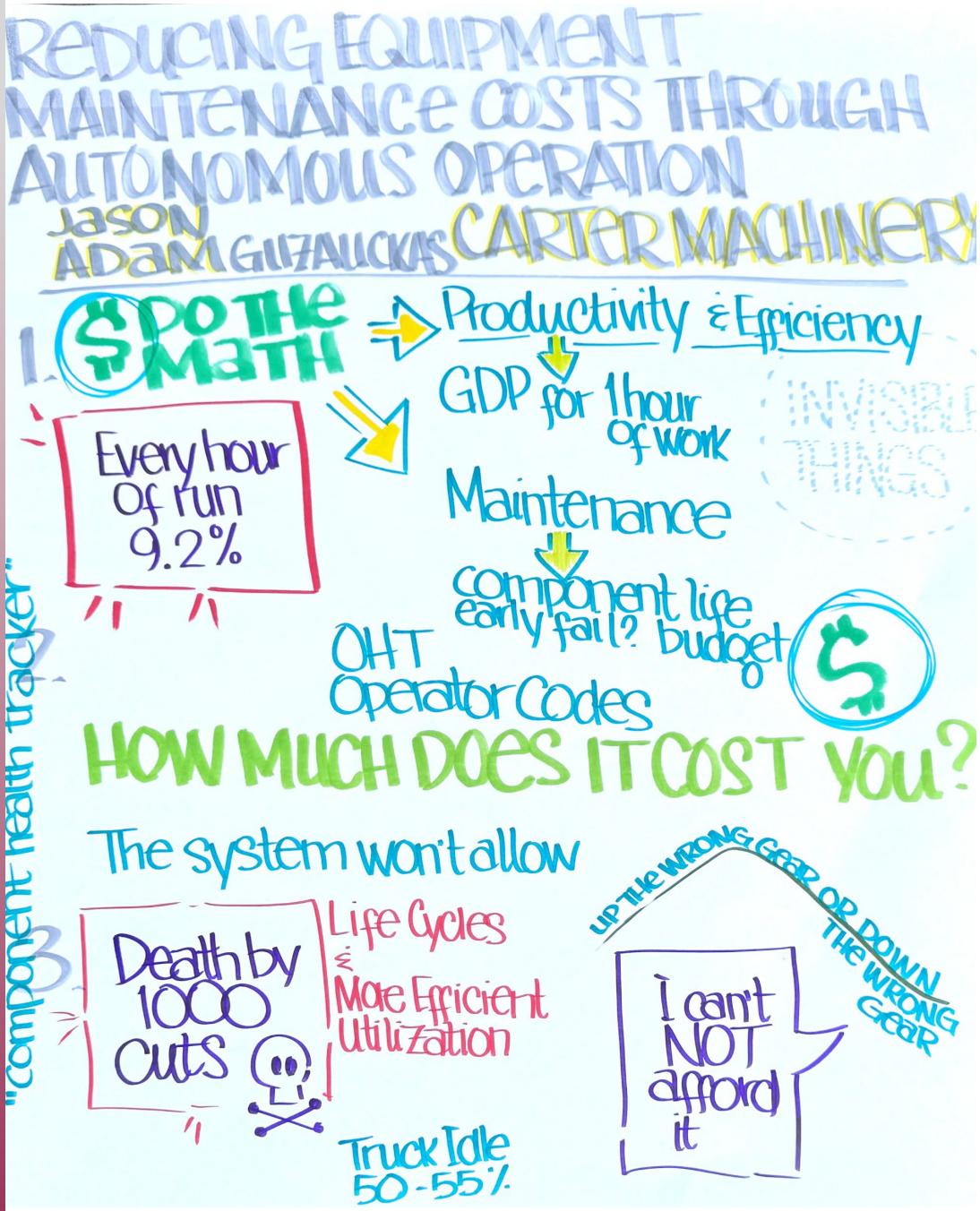
Drones and Machine Learning for Blast Design Optimization

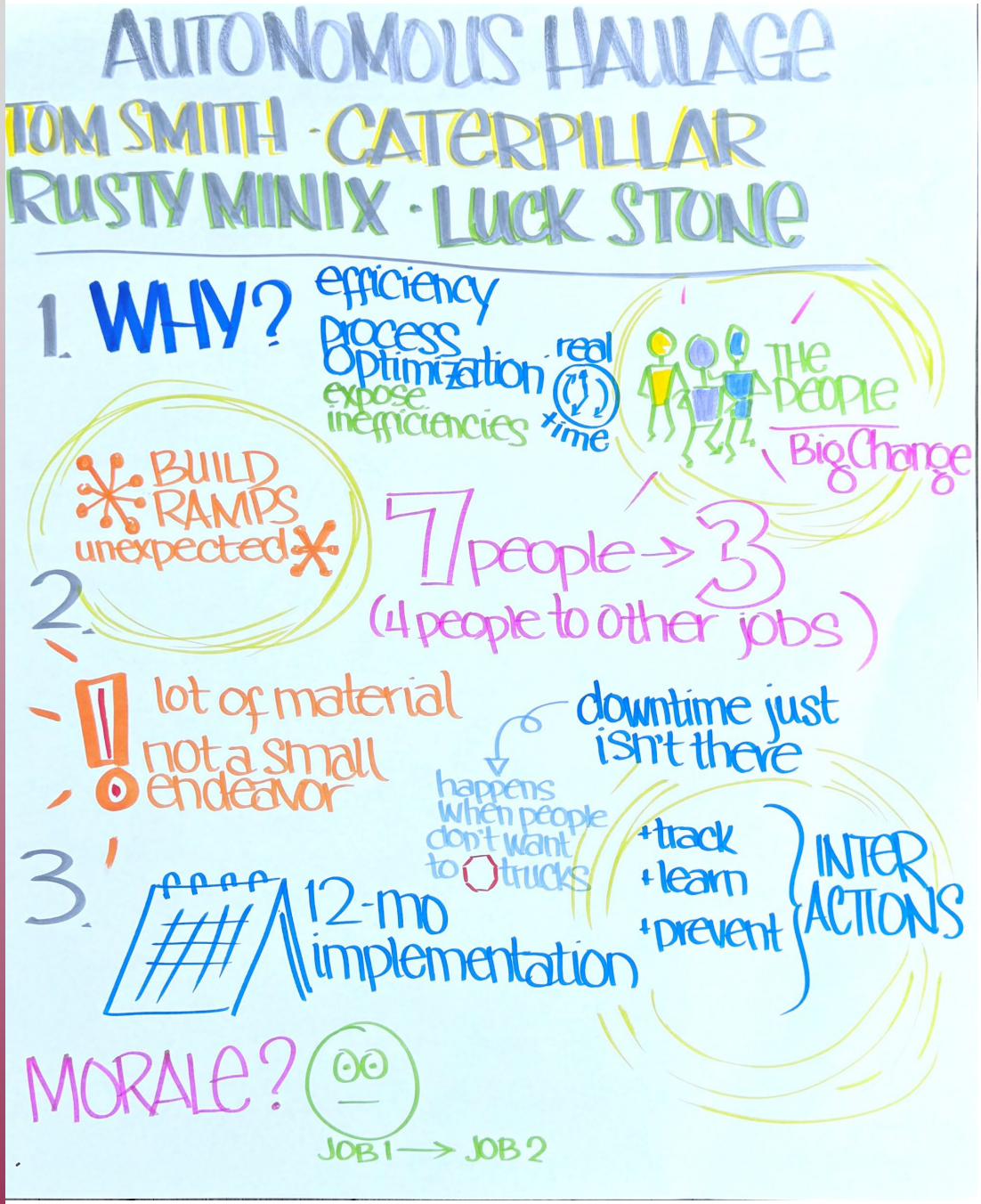
NOx Tracking in Blasting with Drone and Machine Learning



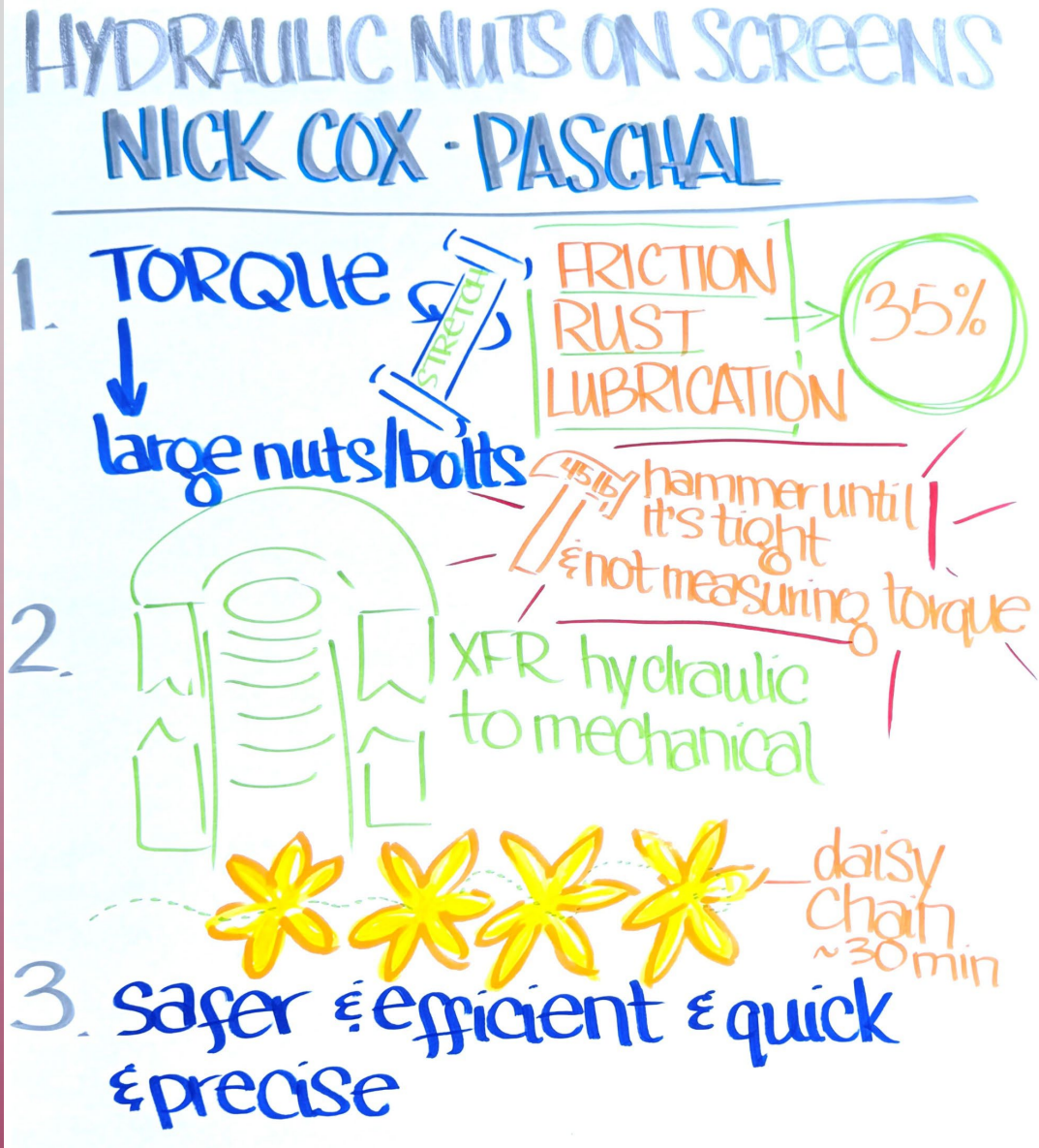
Reducing Equipment Maintenance Through Autonomous Operation



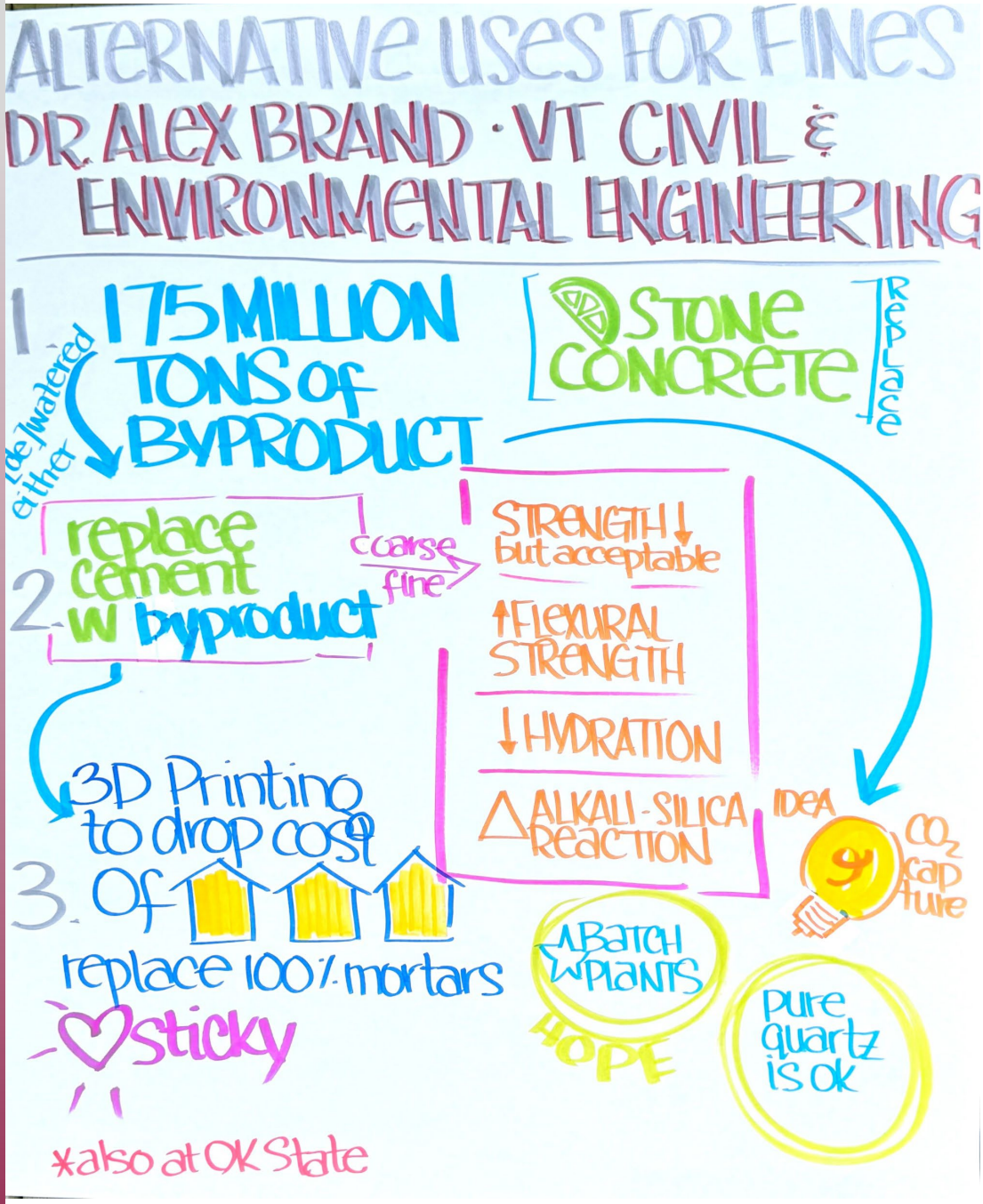
Autonomous Haulage



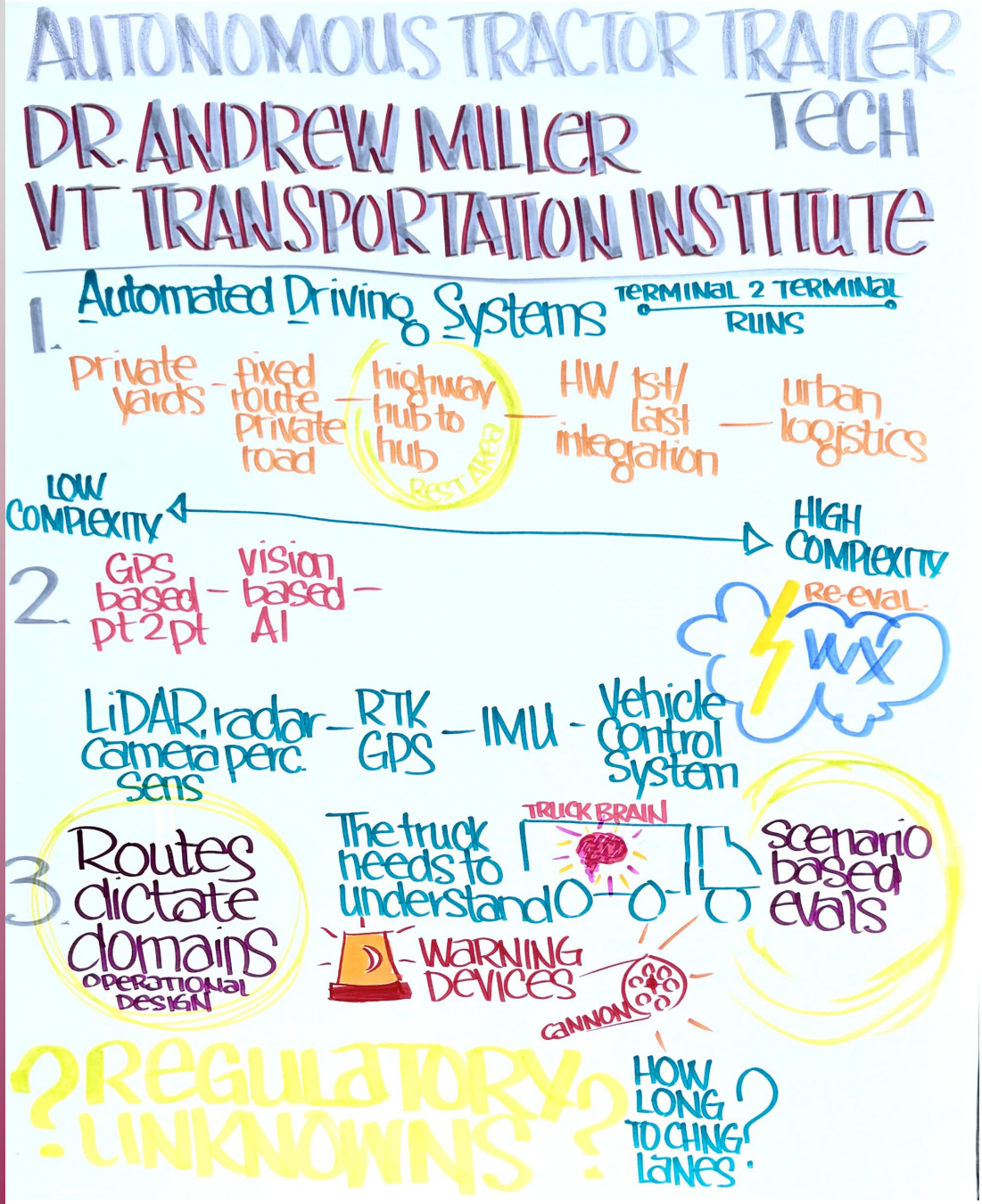
Hydraulic Nuts



Alternative Uses for Fines



Autonomous Tractor Trailer Technologies



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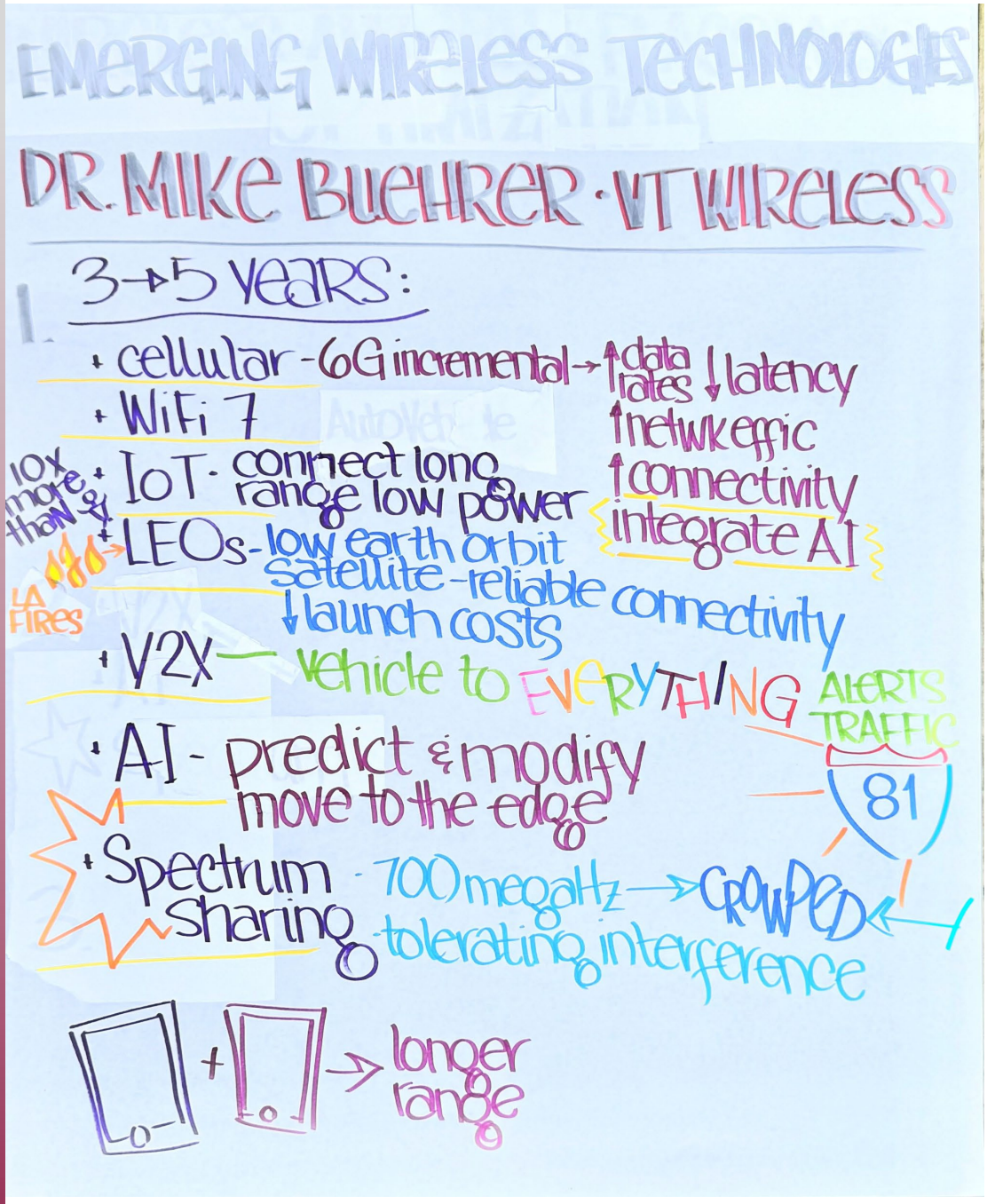
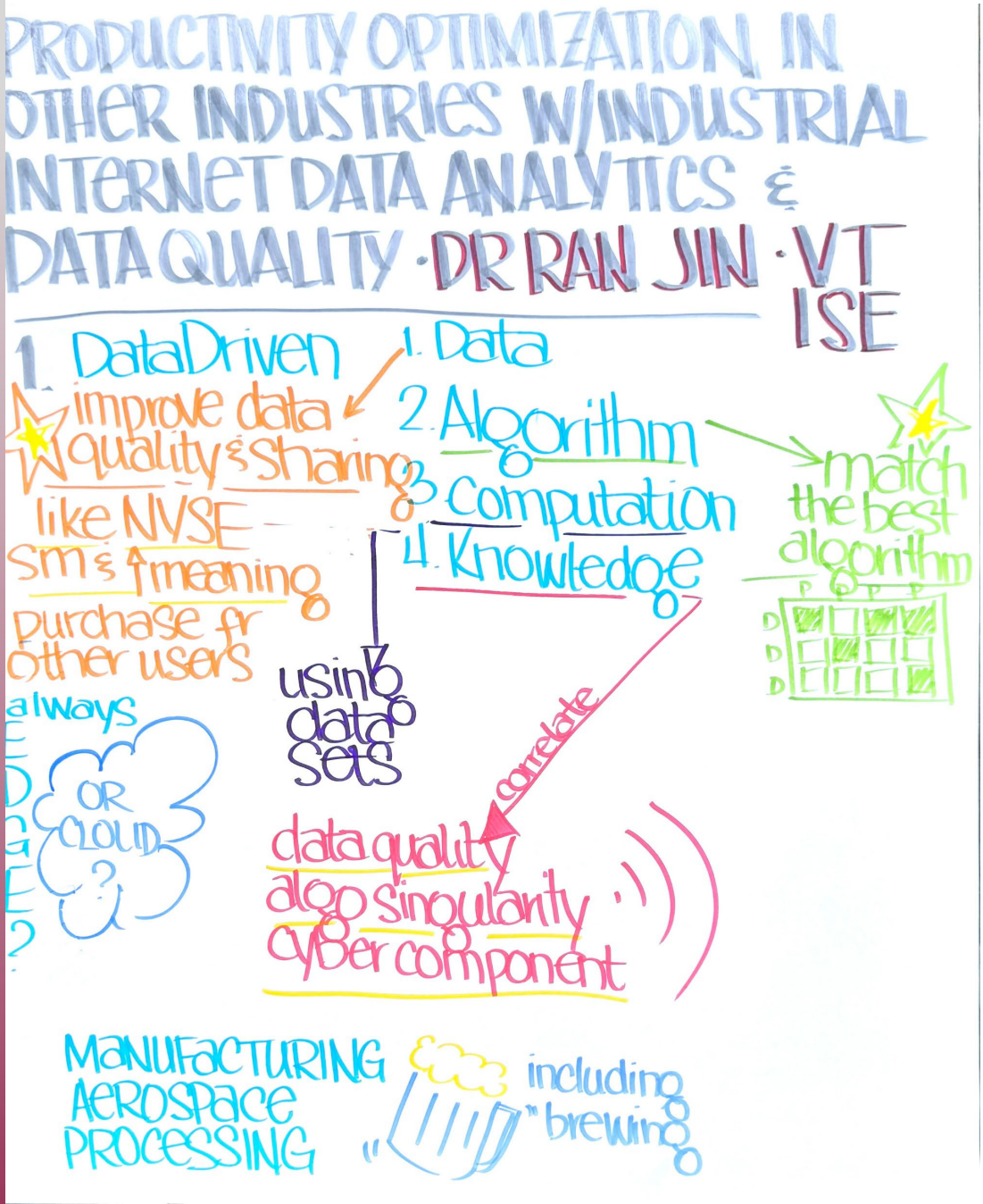
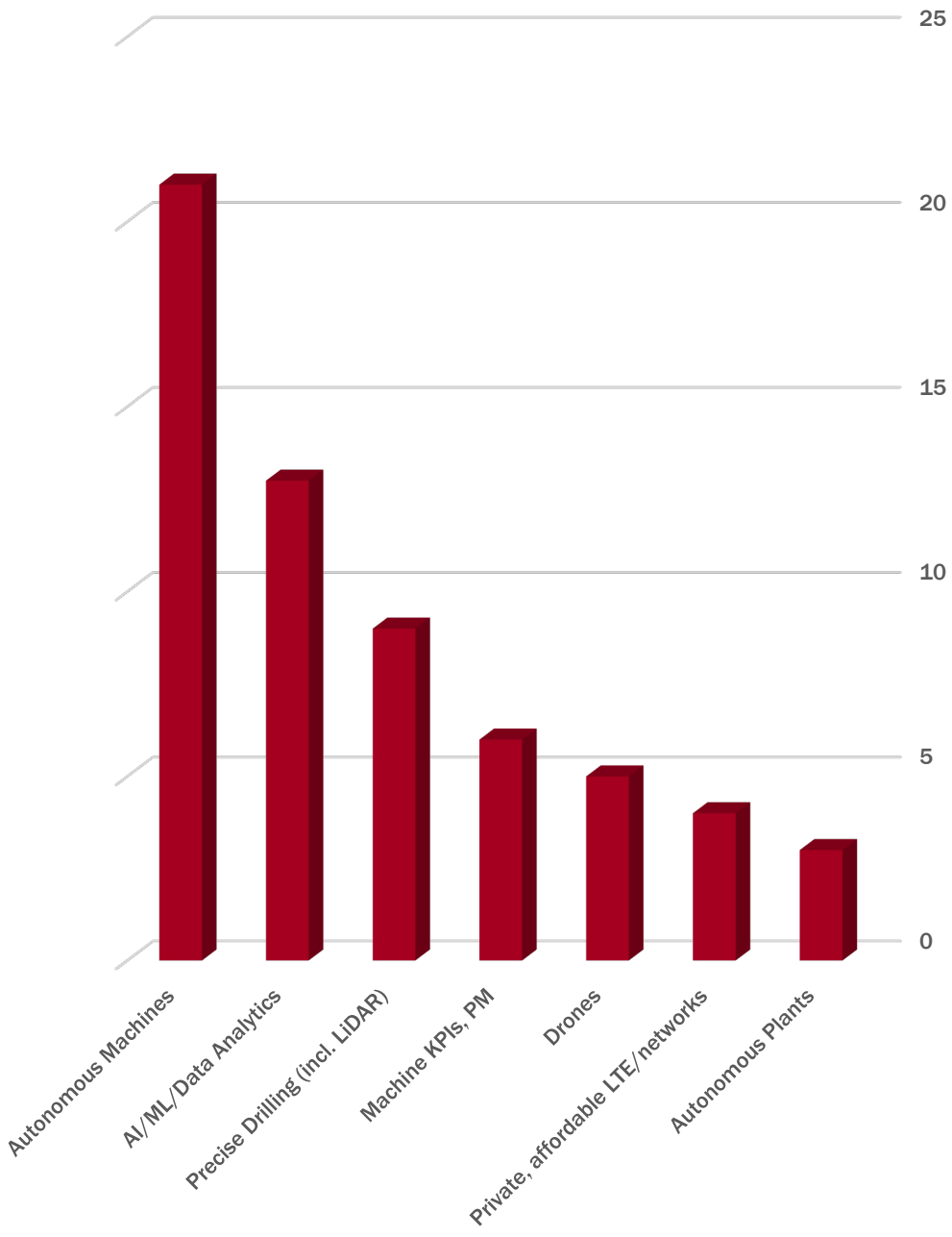
Emerging Wireless Technologies



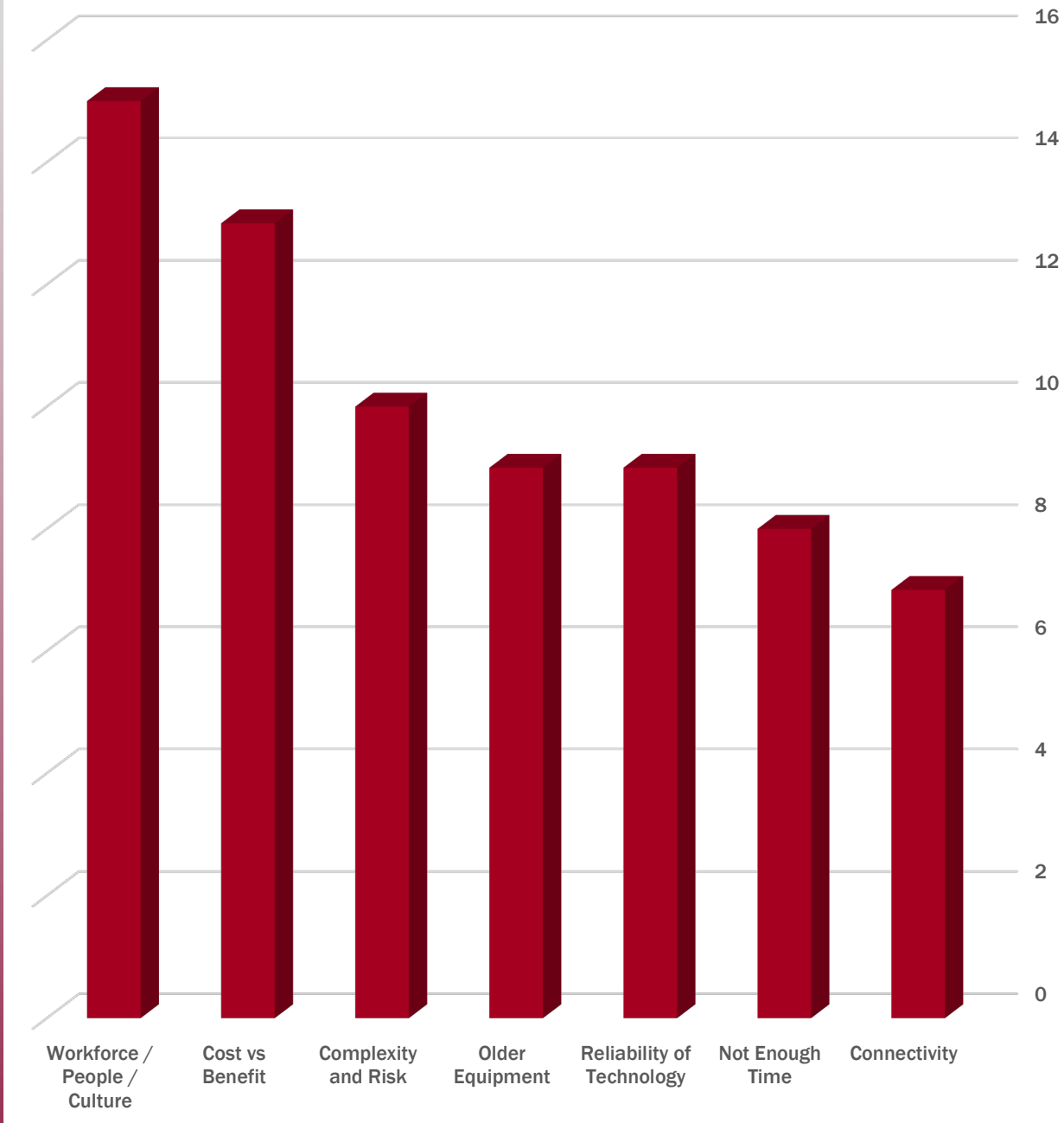
Productivity Optimization with Data Analytics



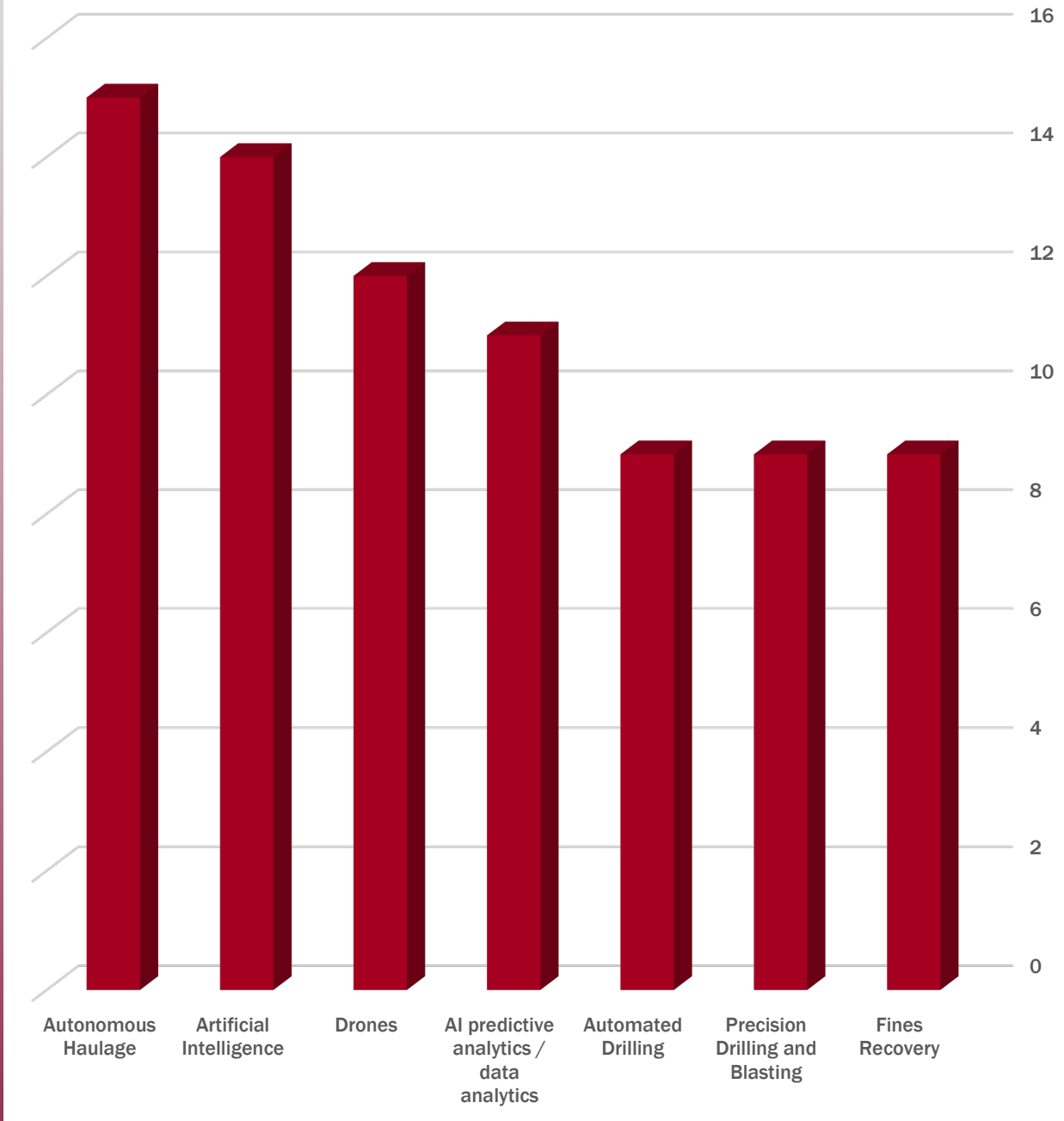
What Current Technologies Excite You Most?



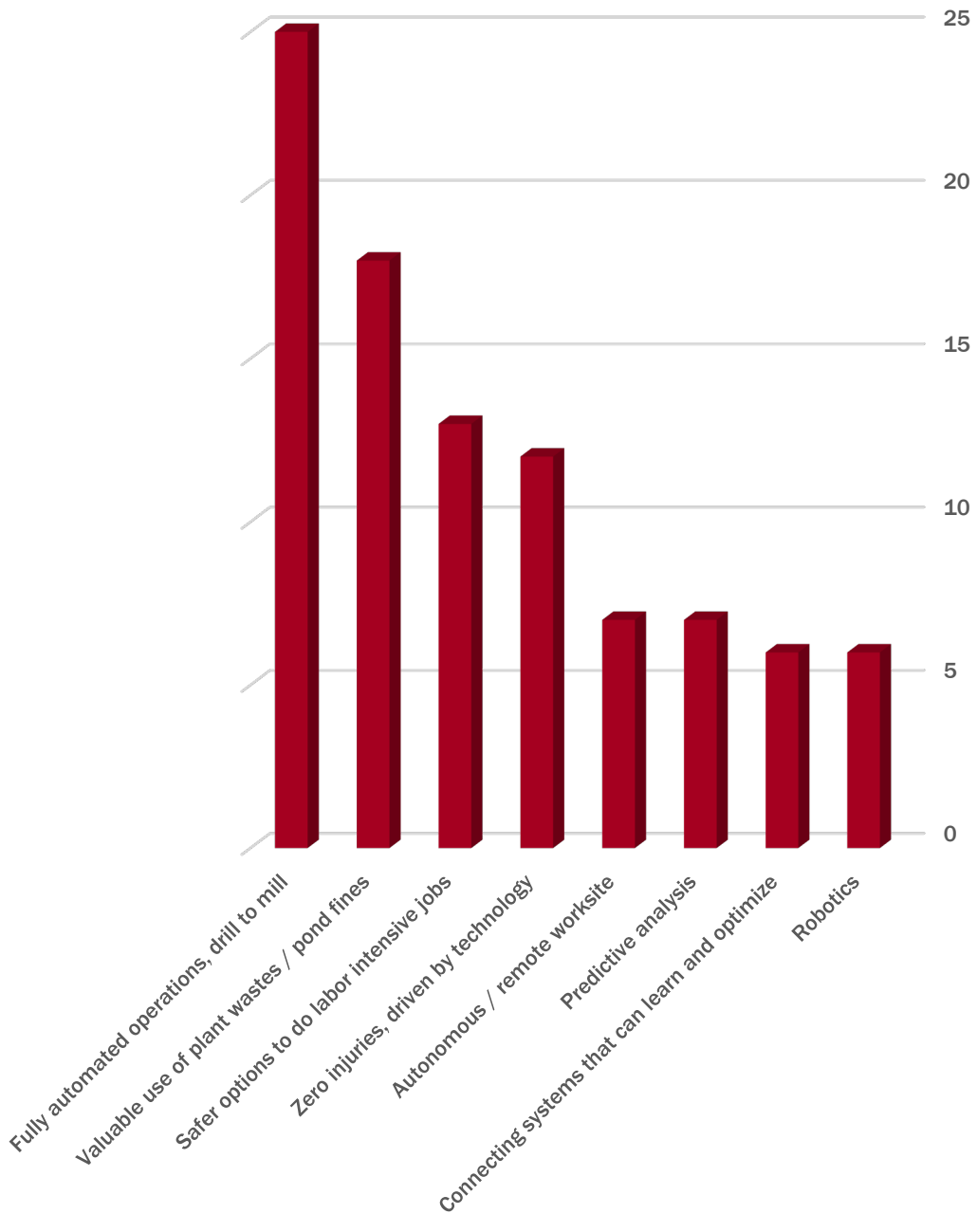
What Are the Top Barriers to Adopting New Technology?



What Technologies do you Anticipate Being the New Normal in 10 Years?



What Technologies do you Dream About for Our Industry?



Conclusions

1. There is a clear interest in currently available technologies including autonomous equipment, AI/data analytics, and precision drilling.

2. However, there are several hurdles that exist to implementing these existing technologies. The key barriers include workforce/culture, payback period (including the need to update equipment), and risk/reliability.

3. Within the next 10 years, it is anticipated that autonomous haulage, the use of AI/data analytics, the use of drones, and automated precise drilling will be commonly used technologies within the crushed stone industry.

4. In the longer time frame, there is a strong desire to see the development of fully automated drill-to-mill operations, a profitable market for fines/dust, and continued improvement in safety due to increased use of technology.

<u>The development and implementation of these technologies will be expedited by strong cooperation between producers, equipment manufacturers, universities, and other sectors of our industry.</u>

Built for the Mine is an educational partnership between mining industry leaders and the Virginia Tech Department of Mining and Minerals Engineering.

The mission of Built for the Mine is to "Develop the next generation of people and technology for the next generation of the aggregate industry." This mission will be accomplished by establishing and growing a partnership between industry representatives and the Mining and Minerals Engineering Department at Virginia Tech.

The vision of Built for the Mine is to have an industry brand and be the recognized leader for developing talented graduates who are prepared to fill the growing knowledge gap within the aggregates industry created by the onset of the Fourth Industrial Revolution.

The program prepares students for careers in mining by enhancing goal-setting, improving interview and resume skills, developing professional paths, networking with industry leaders, and giving them access to internships and employment opportunities.

For more information,
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