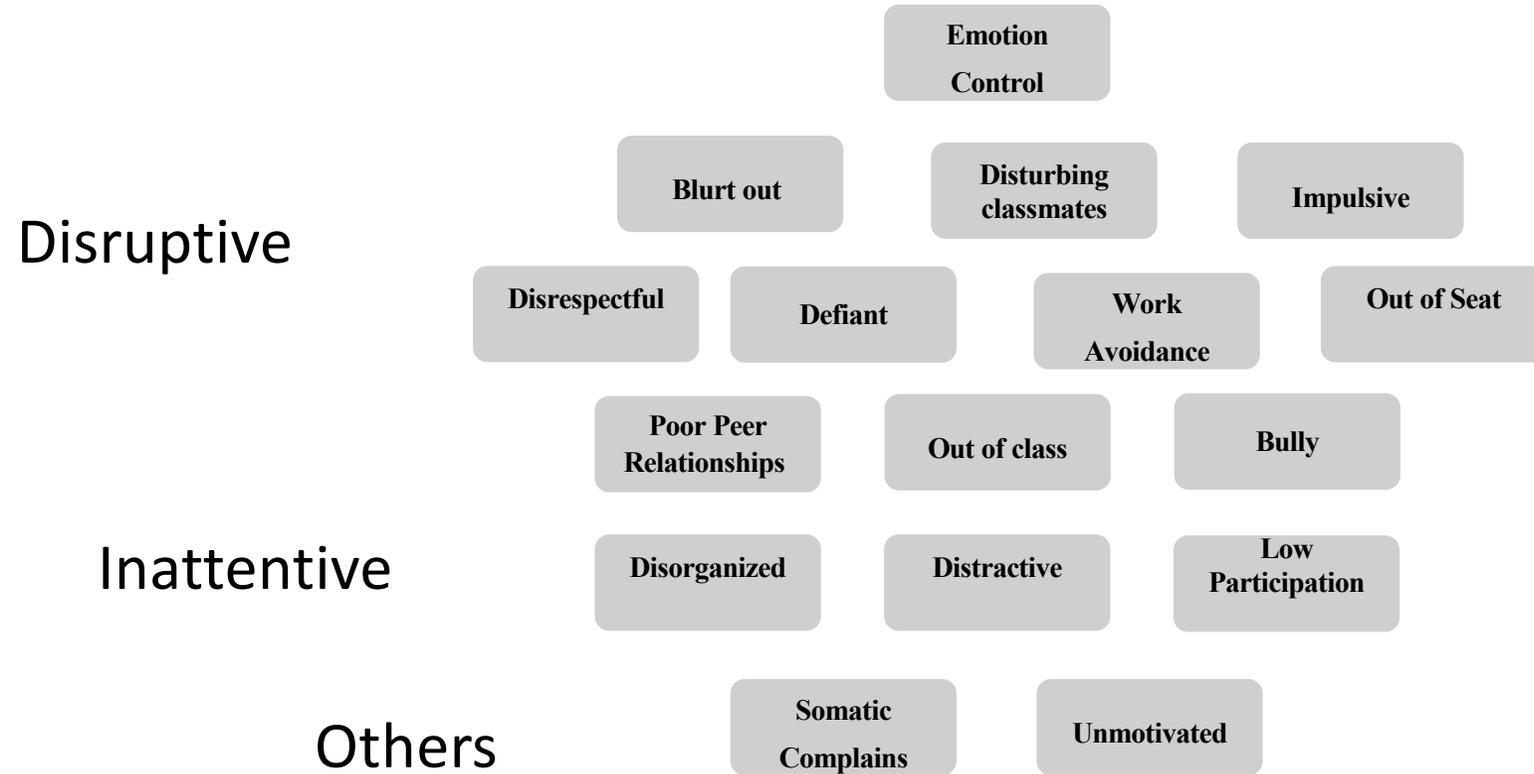


**Explore the Robot Paraeducator
Service Range for ASD and ADHD
Students in School Setting**

Autism Spectrum Disorder

- Approximately 1 in 36 children (2.8%) in the United States was identified with ASD in 2020, according to the U.S. Centers for Disease Control and Prevention (CDC).
- ASD is often associated with other conditions like anxiety and attention-deficit/hyperactivity disorder (ADHD). The rate of clinically elevated ADHD and anxiety symptoms in ASD was 62.7% and 44.6%. (Avni, Ben-Itzhak, Zachor, 2018).
- Autistic students tend to have low self-esteem and be isolated from their mainstream peers, because they are disconnected from social learning. (Brown and McIntosh, 2012; Fulton et al., 2014)
- 63% of children with autism have been bullied at some point in their lives. (Interactive Autism Network, 2012)
- Social skills developed in early years have a significant impact on adults' wellness. (Greenberger, & Cowley, 2015)

Behaviors



Typical Scenario– A (Hyperactive)

A walked back to class from a break.

Patted classmates on her way back to the seat.

Took away the new student's cellphone.

A classmate stood up for the new student.

A argued loudly with the students, then tossed back.

Impulsive

**Getting
Attentions**

**Emotion
Control**

**Disturbing the
Class**

Defiant

**Poor Peer
Relationships**

Typical Scenario—B (Inattentive)

The teacher is writing notes on the board.

B was playing with her fingers.

Para prompted her back to attention.

B Started to take notes.

The class teacher moved on to the group activity.

B was still copying the notes, not participating group activities.

Inattentive

Visual Stimming

Behavioral Rigidity

Social Disconnection

Drift

Inflexibility

Low Participation

Individualized Education Program (IEP)

IEP Individualized Education Program

- FBA Functional Behavior Analysis
- BIP Behavior Intervention Plan

PBIS Positive Behavioral Interventions & Supports

Who is Para?

What do they do?

- Implement interventions and supports to students with Individual Education Programs (IEP).
- Collaborate with teachers.
- Needs to be emotional stability and commitment.
- Are the essential support for students' success.



Barriers to helping ASD students in school

Lack of inclusive support staff

Untrained paraeducators

Insufficiency of social and foundational supports to the para

Low motivation due to inadequate pay

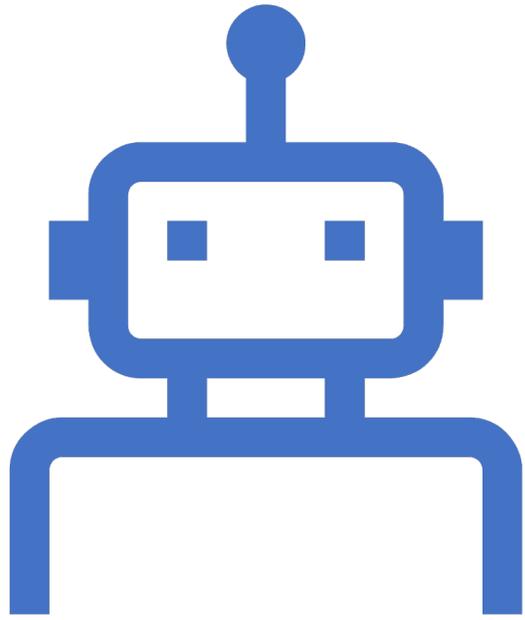
Parents' deficiency of trust

“I can’t do this anymore. She (student A) ordered me like her servant.”

~the paraeducator

“Just be a Robot.”

~the school principal



How about a Robot Para?

- Research proved that Robot-mediated interventions significantly improved social functioning in autistic children. (Lee & Liang, 2019 , Misbah & Vladimir , 2021)
- Topic: Explore the service range of a “Robot Para” designed to provide positive behavioral interventions and support for autistic students in a school setting.
- Method:10-month contextual inquiry in a public middle school to two ASD students and a Para.

Robot's Functions

- Trust Establishment
- Behavioral Interventions
- Learning Assistance
- Social skill training



Behavioral Interventions

PBIS: Positive Behavioral Interventions & Supports

Customized to the student

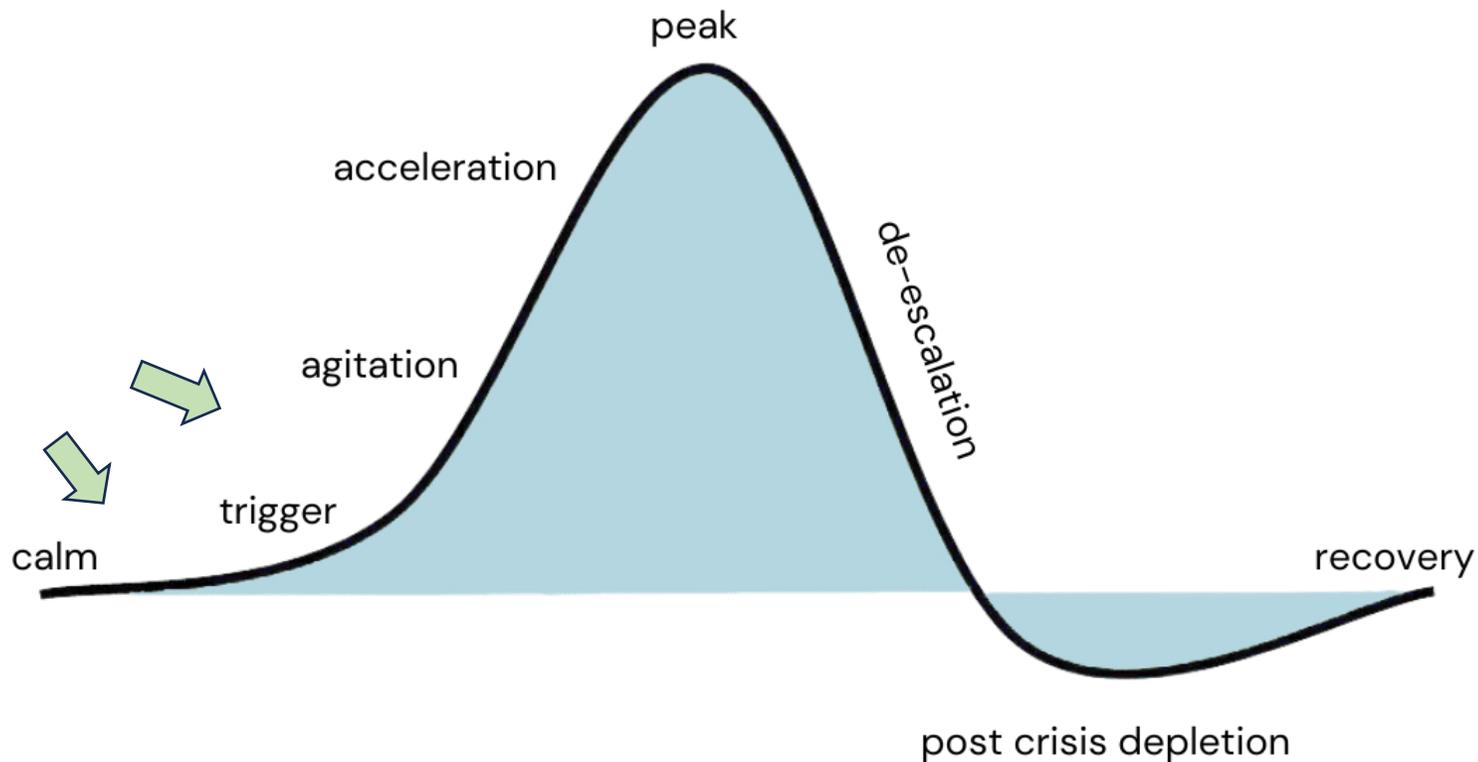
- Try multiple interventions
- Each intervention should be tried for a minimum of 4 weeks, & more than 1 intervention may be implemented at the same time.
- Collect and track specific data on each intervention tried & its effect
- The IEP team will review the progress and refine the goals quarterly.

Interventions

Interruptive Behaviors	Examples of Interventions	Rewards	Discipline Referrals
Out of seat	<ul style="list-style-type: none"> • A quick reminder of the work • Reminder of rewards • Take a fresh air break • Stretching area 	<p>Token System: Students earn tokens for demonstrating desired behaviors and exchange them for rewards.</p> <p>Verbal praise: Acknowledge and praise students when they exhibit positive behavior.</p> <p>Privileges: Such as extra recess time, sitting next to a friend, or being the line leader can be used as rewards.</p>	<p>School discipline referral: It is simply a way for a teacher to refer a student to an administrator to be disciplined.</p> <p>Warnings: When something is out of control, para warn of discipline referral. Three warnings accumulated will trigger a school discipline referral.</p>
Out of class	<ul style="list-style-type: none"> • Take a break, • Warning of the school discipline referral • Self-monitor chart 		
Work Avoidance	<ul style="list-style-type: none"> • Give a small piece of work a time. • Use a timer • Reminder of work 		
Disturbing classmates	<ul style="list-style-type: none"> • Model the social skills • Redirect to work • Use the structured break • Reminder of the parent's expectation 		

Preventions

pattern occurring before, during, and after a meltdown



A Typical Scenario

A walked back to class from a break.

Pat classmates on her way back
Took away the new student's cellphone.

A classmate stood up for the new student.

Apple argued loudly with the students.

**Prevention:
Reminder of "keep
our hands to
ourselves".**



**Model the social skill:
"Your cellphone is
cute."**

Thumb-up

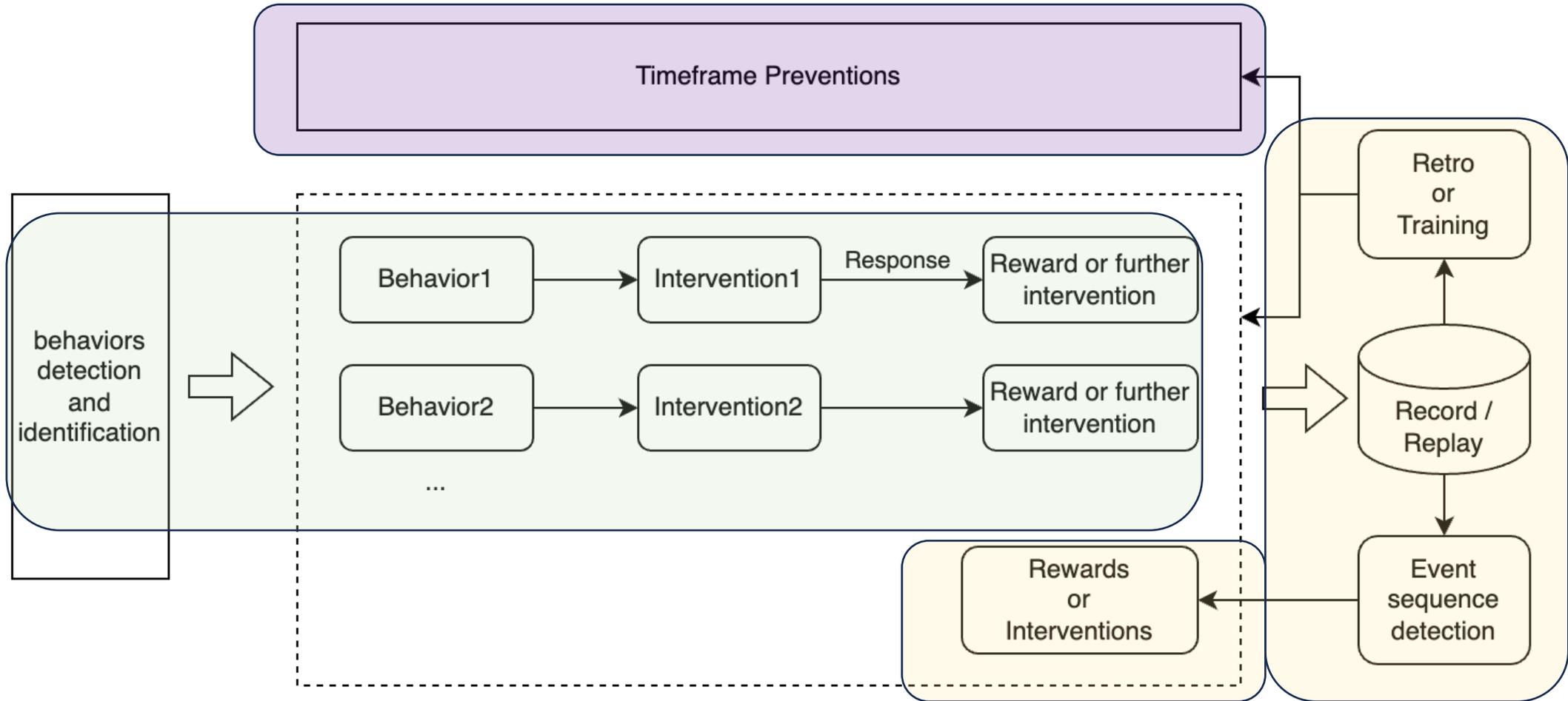
**Model the social skill
of apologize**

Thumb-up

**Redirect to the quiet
space.**

Give a warning

• Behavior Intervention Framework



Hardware Requirements

Input Sensors Requirements

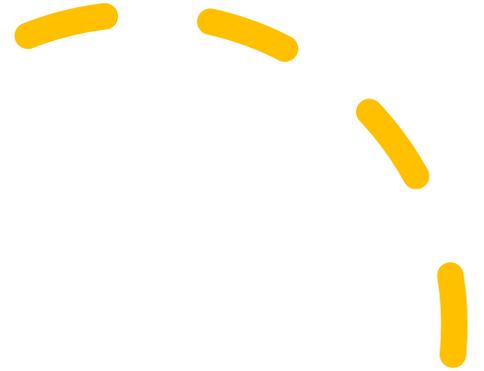
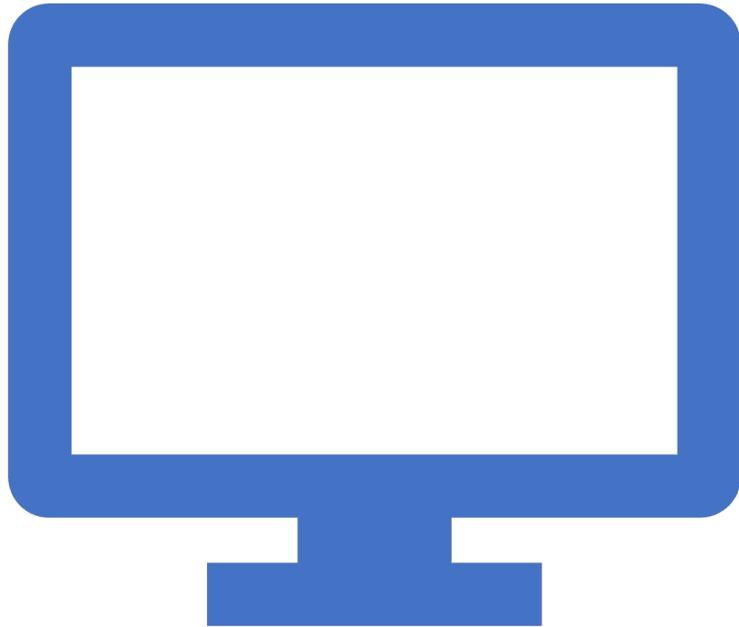
- Image or video
- Sound
- Motion tracking: like a detachable Drone-driven balloon figure that monitors the student when she runs out of the classroom.

Output devices Requirements

- Screen display
- Sound
- Eject the tokens
- Mechanic arm

Computation and storage requirements:

- Identify and map multiple input signals in period to behaviors
- Record and store events in DB to retro or replay



The advantage of a Robot Para



Firstly, it seamlessly integrates with the PBIS framework, ensuring emotion neutrality and consistency.



Secondly, it revolutionizes the labor-intensive and error-prone manual tracking and reinforcement of behaviors. The Robot Para streamlines IEP data collection and monitoring.

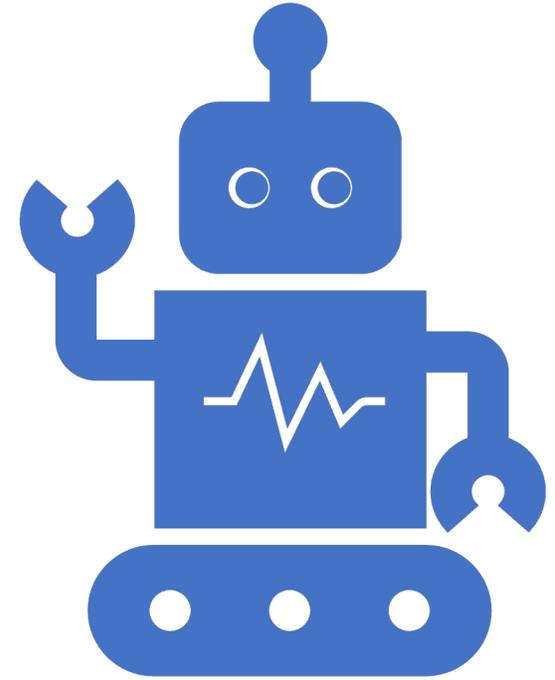


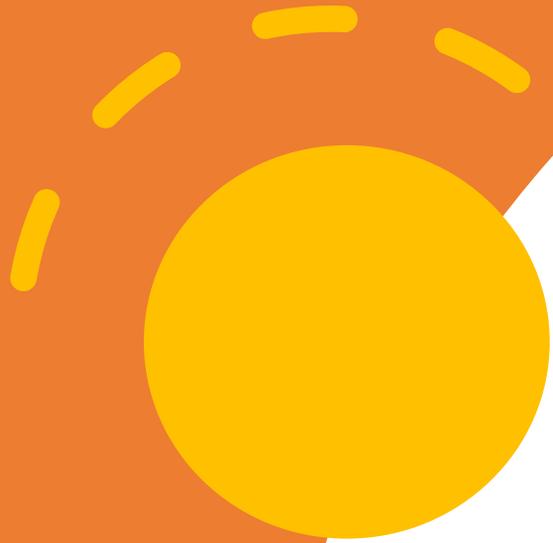
Thirdly, it provides irrefutable evidence of school service and student behaviors in conflict cases, a game-changer in the field.

The Limitation

Instead of replacement, the robot will be an educational tool to remove the barriers of the human para.

- The robot design will be limited to the technology of the sensors and response.
- It will require considerable AI training and revising to adapt to different students.
- It will be limited to the prevailing and easily caught behaviors.
- Some interventions cannot be performed by a robot.





Thank you

Questions?