Transmission ITP

Communications

PJM State & Member Training Dept.

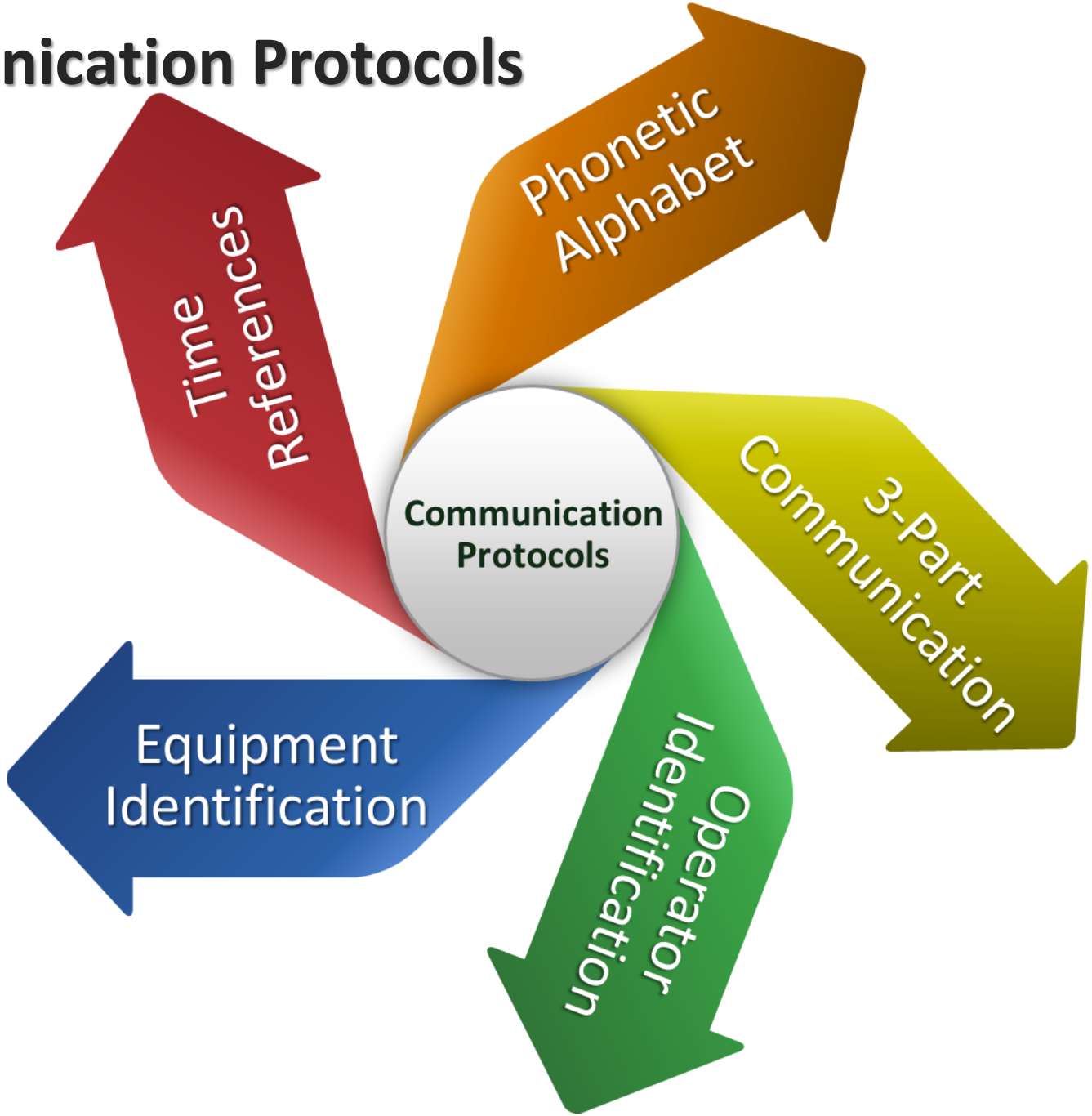
Objectives

Students will be able to:

- Identify the various PJM communication protocols and procedures
- State the function and use of the PJM All-Call System

PJM Communication Protocols
3-Part Communication

PJM Communication Protocols



PJM Communication Protocols

- PJM Communication Protocols coincide with NERC Standard COM-002-4*
- Communication Protocols from PJM Manual 1*
  - Applicable to all Operators/Dispatchers who issue/receive Operating Instructions
- The purpose is to improve communications when issuing and receiving Operating Instructions

*PJM Manual-1, Section 4.5

PJM Communication Protocols

Operating Instruction Definition

- A command by operating personnel responsible for the Real-Time operation of the interconnected Bulk Electric System to ***change or preserve the state, status, output or input*** of an Element of the Bulk Electric System or Facility of the Bulk Electric System

PJM Communication Protocols

- Communication protocols are based on issuance of an Operating Instruction
- The use of 3-part communication is required when issuing or receiving an Operating Instruction
- This would apply during both normal and emergency operations

*PJM Manual-1, Section 4.5

PJM Communication Protocols

- NERC COM-002 has a zero tolerance for failures to use 3-part communication during an Emergency
  - Applicable NERC terms: Emergency, BES Emergency, Capacity Emergency, Energy Emergency
  - The compliance implications for not utilizing three-part communication are more severe during an Emergency
    - From the point at which the Emergency begins to the point that the Emergency ends

PJM Communication Protocols

PJM Communication Protocols

Point at which the Emergency Begins	Point at which the Emergency Ends
Any real-time (actual) IROL exceedance	Real-time IROL exceedance ended
Any real-time (actual) SOL exceedance above a facility's emergency thermal rating	When the real-time SOL exceedance is below the emergency thermal rating
Any real-time (actual) SOL exceedance below a facility's emergency low voltage rating	When the real-time SOL exceedance is above the emergency low voltage rating
PJM Manual 13, Section 2.3.3 'Capacity Emergencies': Steps 1 through 10	When the final step is cancelled
PJM Manual 13, Section 5.2 'Transmission Security Emergency Procedures': Steps 1 through 10	When the final step is cancelled
Load Shed issued	Load shed has mitigated the emergency condition

PJM Communication Protocols

Operating Instruction Examples*
Ordering Transmission equipment in or out of service
Load shed instructions
Ordering generation MW/MVAR output changes
Ordering generation online or offline (real-time or in advance)

*Partial List

PJM Communication Protocols

Non-Operating Instruction Examples*
Confirmation of ratings or power flows
Discussion of operational options
Discussions of generator status availability

*Partial List

PJM Operating Instructions

What are the requirements of a Member Operator when issued an Operating Instruction?

- PJM Members who are unable to comply with an Operating Instruction should communicate this to PJM immediately
- Restrictions based on ***safety, loss of life, or damage to equipment*** would fall into this category
- If a Member Operator is unable to comply with an Operating Instruction, it is important for them to provide their reasoning as soon as possible

PJM Communication Protocols

Operator Identification

- *Last name* should always be used for identification (at a minimum) along with company name
- All-Call Messages will be confirmed based on confirmation of acknowledgement of message
  - Indicated by Operators selecting “2” to acknowledgement the message

PJM Communication Protocols

Time References and Phonetic Alphabet

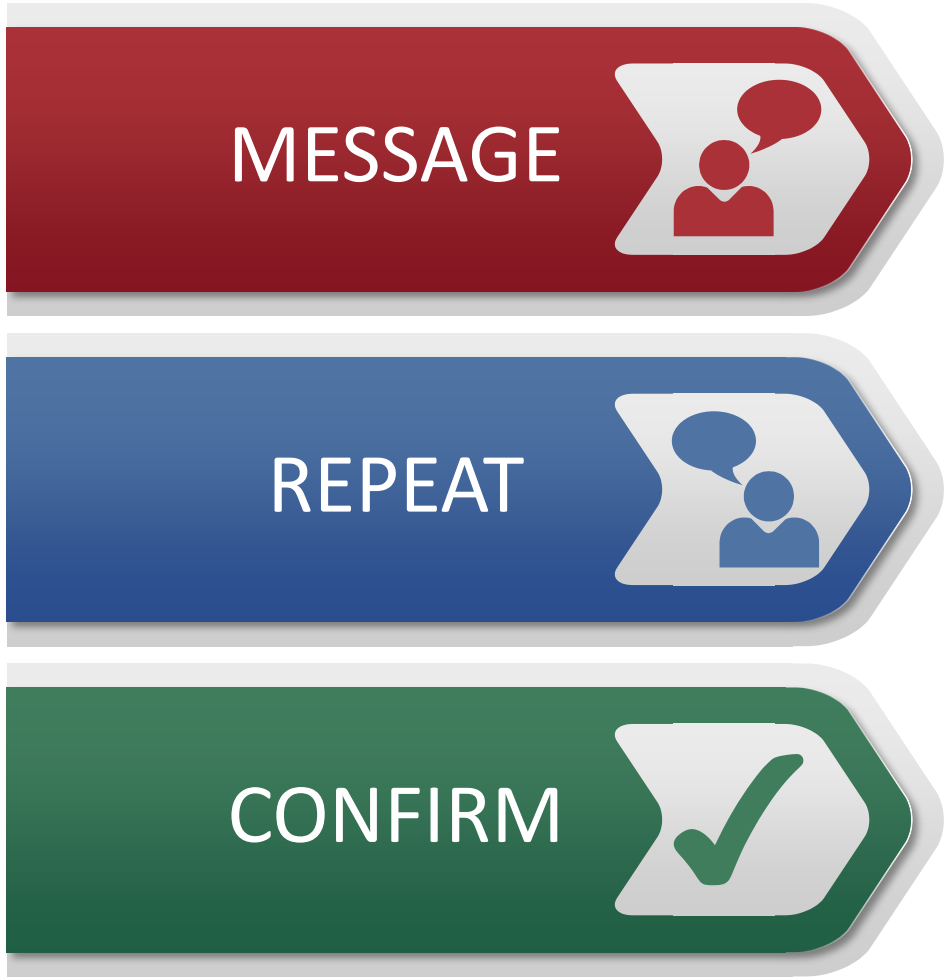
- Time references should be stated in 24 hour format using time zones when appropriate
- Phonetic alphabetic may be used to clarify information as necessary

PJM Communication Protocols

Equipment & Transmission Line Identification

- **Transmission Lines** – Terminal to Terminal, Voltage level and line number
- **Other Equipment/Substation** – Station name, equipment number equipment type
- **Generating Station** – Station name, unit number

3-Part Communication



- "Operating Instructions" as defined in M-1 required the use of 3-Part Communication
- Internal audits are performed to verify use of 3-Part Communication
- Best practice:
  - Use of 3-Part Communication for all exchanges

3-Part Communication

- ✓ Clear & Concise
- ✓ Speak Slowly
- ✓ Re-start communication process when signs of confusion are present

3-Part Communication

- ✓ Ask for clarification if necessary
- ✓ *Understand* information
- ✓ Repeat back information correctly and thoroughly

Note: Provider/Sender of information should prompt repeat of information if not done voluntarily

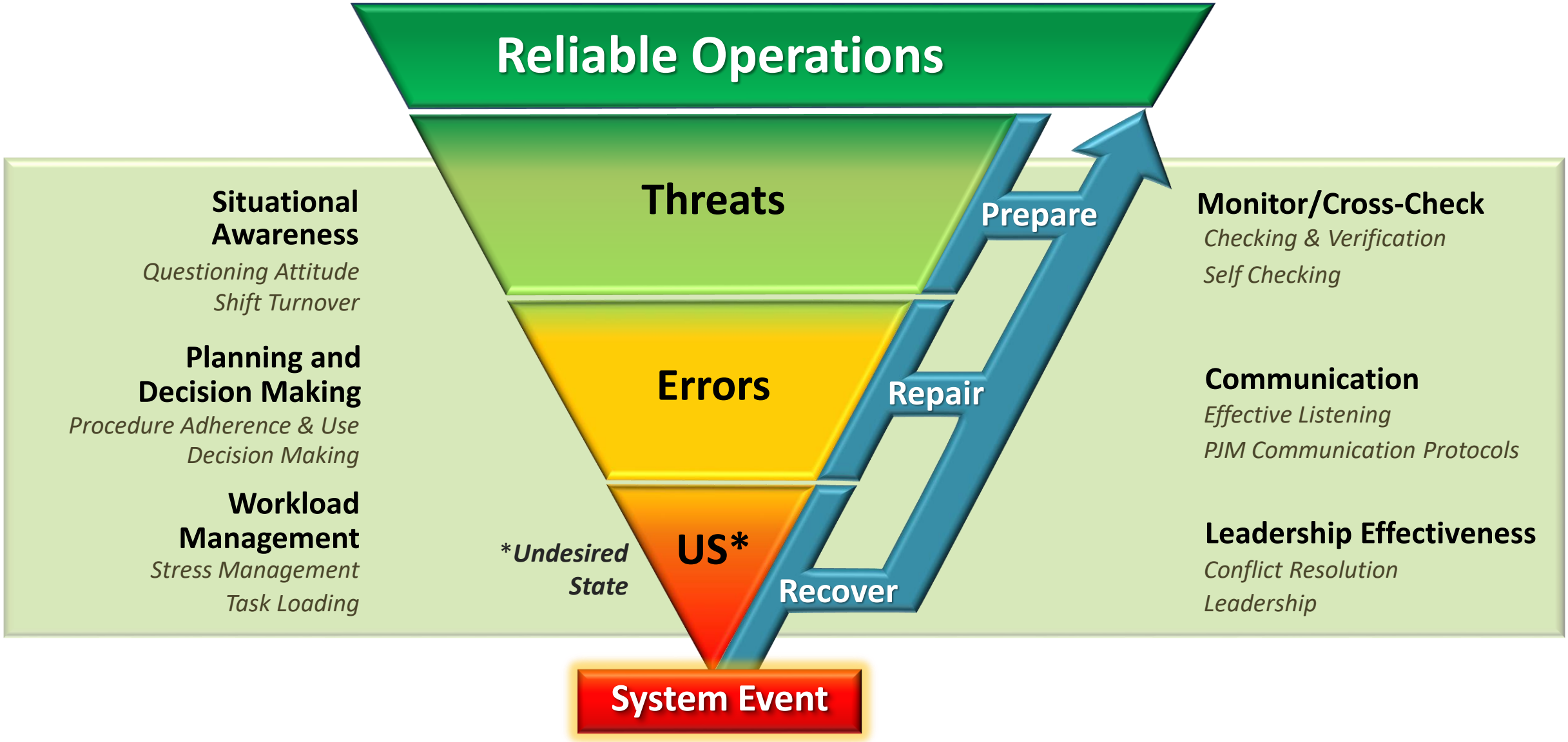
3-Part Communication

- ✓ Repeat message if necessary
- ✓ Correct receiver of information if repeated incorrectly
- ✓ Provide *proper* confirmation

Acceptable	Unacceptable
Yes, that is correct	Yeah, man
Ok, that is correct	OK
Correct	Alright, yeah, bye

PJM CRM-TEM Model

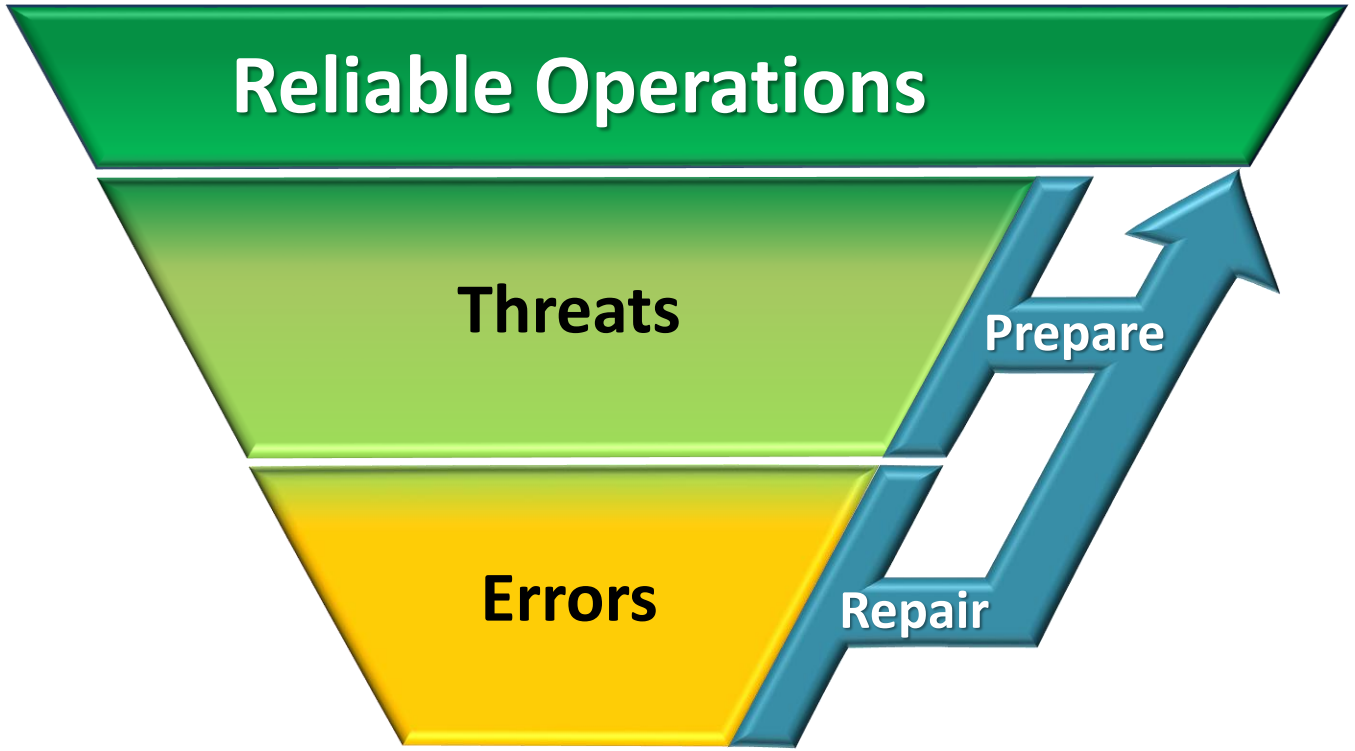
PJM CRM-TEM Model



PJM CRM-TEM Model

Occur outside the control of the team, increase operational complexity, and require attention to manage.

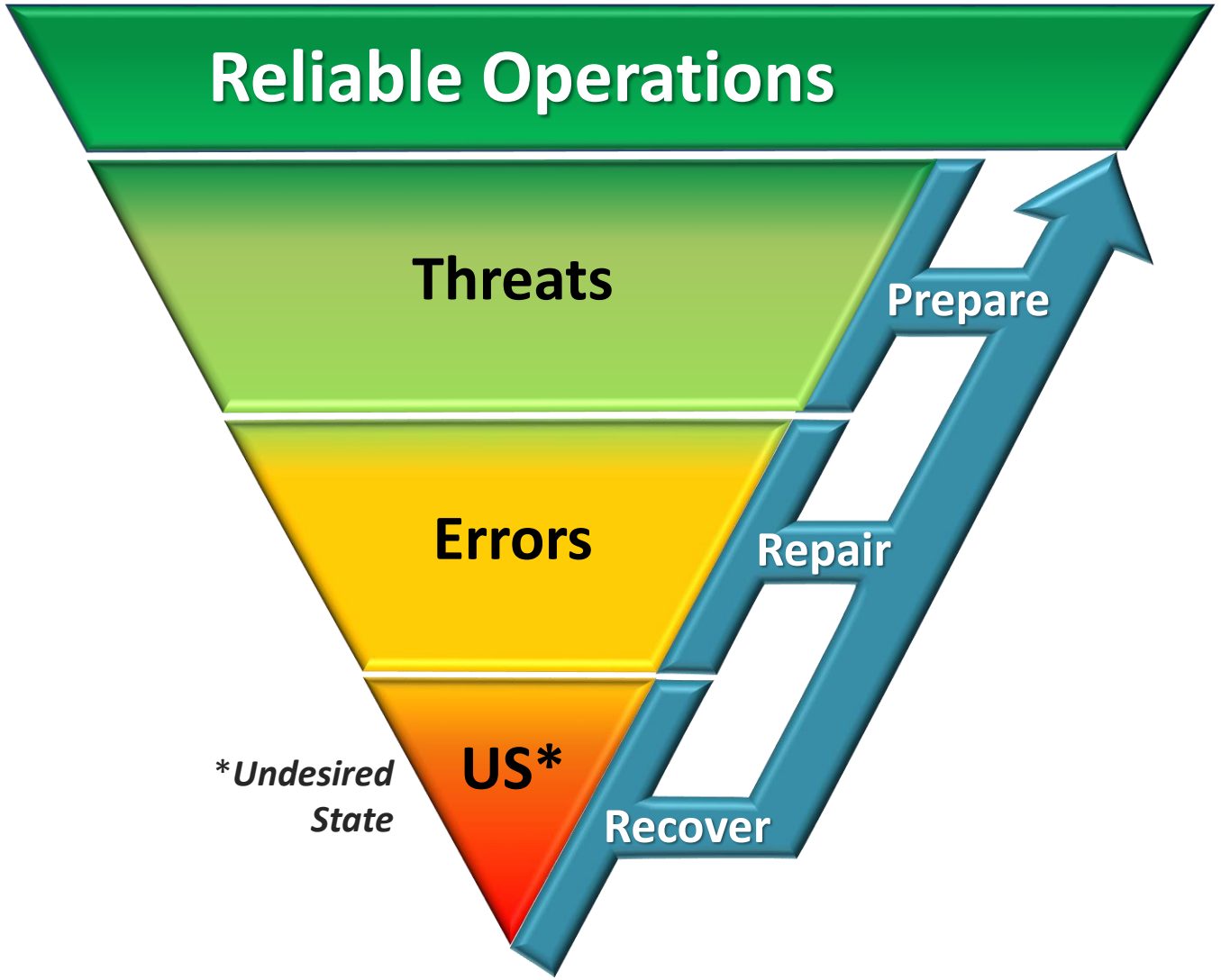
PJM CRM-TEM Model



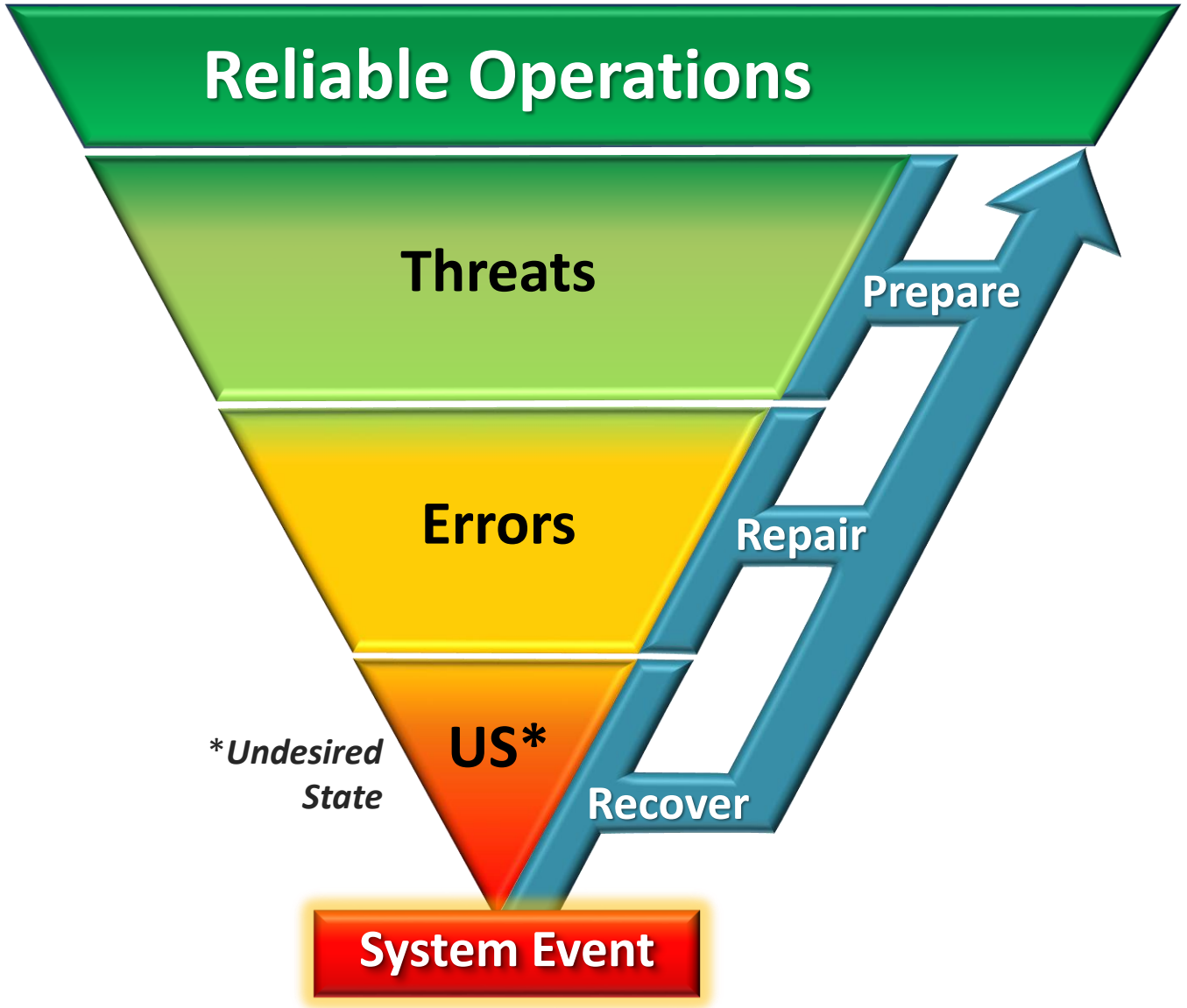
What is ONE WORD that defines the difference between a threat and an error?

ME or YOU

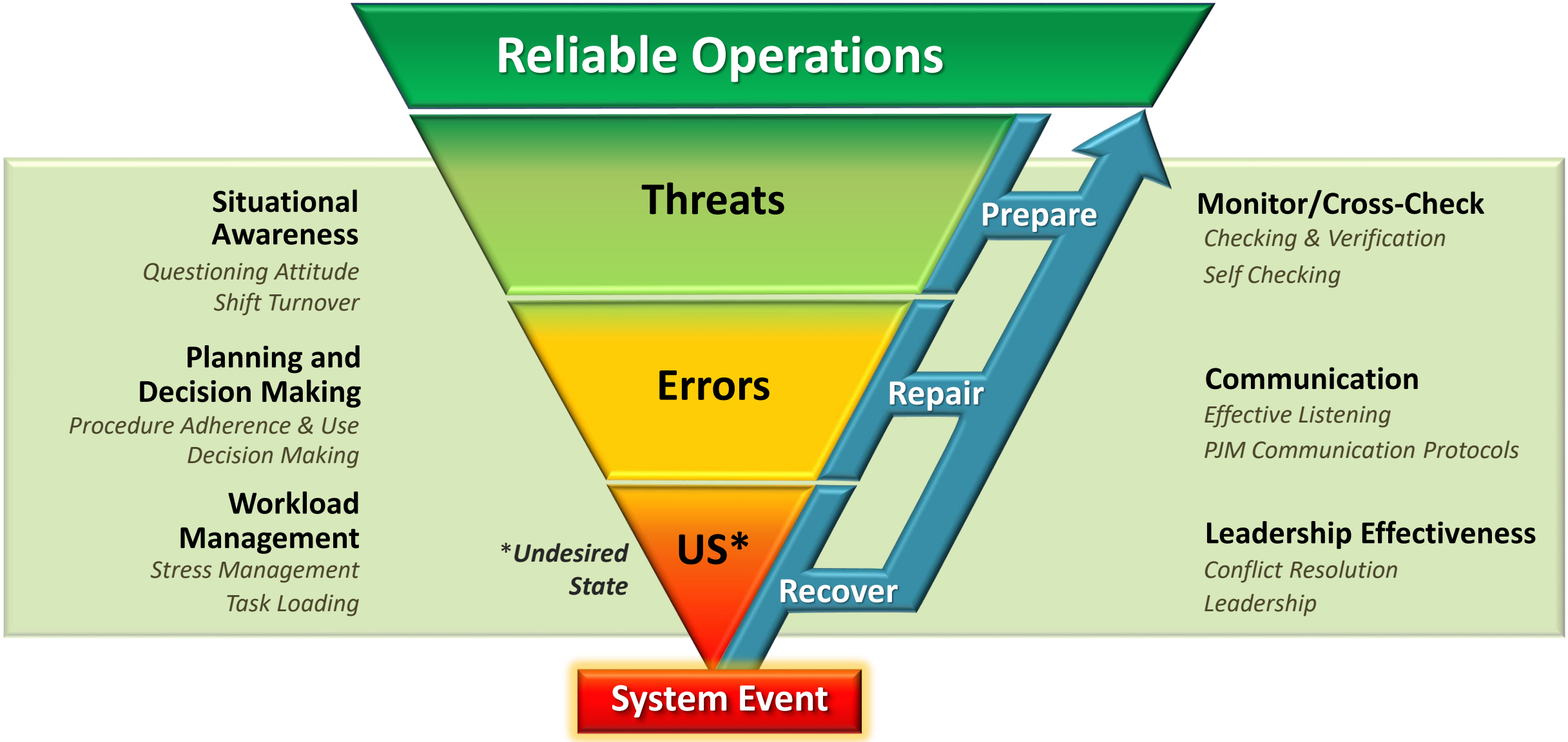
PJM CRM-TEM Model



PJM CRM-TEM Model



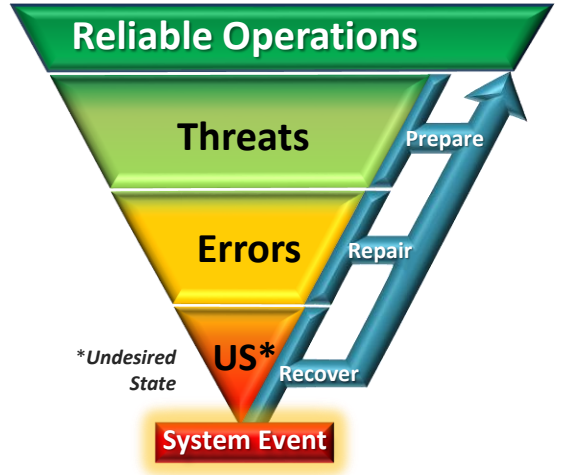
PJM CRM-TEM Model



PJM CRM-TEM Model – *Key Terms*

Reliable Operations	*Normal operations* – the level at which we want to be operating. An environment where Threats and Errors are identified and managed effectively. ***Example: No operating limit violations***
Threats	Prepare for what may occur which is often out of the Operator's/Dispatcher's control. *Prepare and identify* Threats as they take place. ***Examples: Impending weather, equipment problems***
Errors	When Errors cannot be prevented, they must be *identified and repaired*. Errors may fall into any one of the 6 CRM skill buckets. ***Examples: Overtrips, switching errors***
Undesired State	If Errors are not identified and repaired, this may lead to an Undesired State. During this stage, Operators/Dispatchers must *recover* to avoid a System Event. ***Examples: Facility overloads, unknown operating state***
System Event	During a System Event, emergency procedures are likely being utilized and Operators/Dispatchers must continue to *recover and repair* in order to get back to Reliable Operations. ***Examples: Load shed, blackout***

PJM CRM-TEM Model



Situational Awareness

Questioning Attitude

Shift Turnover

Consistently and correctly assesses the current and anticipated environment; identifies and anticipates threats and errors

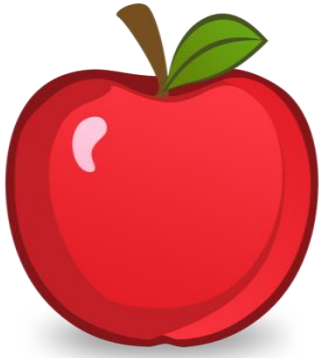
- Ask questions
- Stop when unsure
- Avoid situations where you hear “I think” or “I assume”
- Over-communicate
- Write it down
- “What would I want to know”
- Ask questions

The message received is the only one that counts.

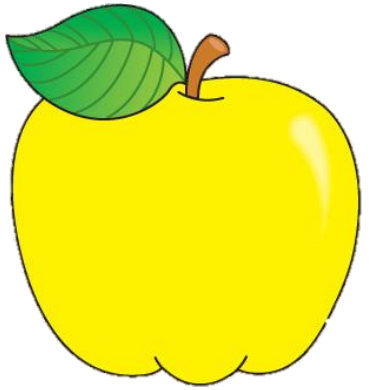
Anything is a potential message, whether it is intended or not.

You can’t transfer meanings from one person to another directly. The receiver creates meaning in his or her mind.

Mental Models



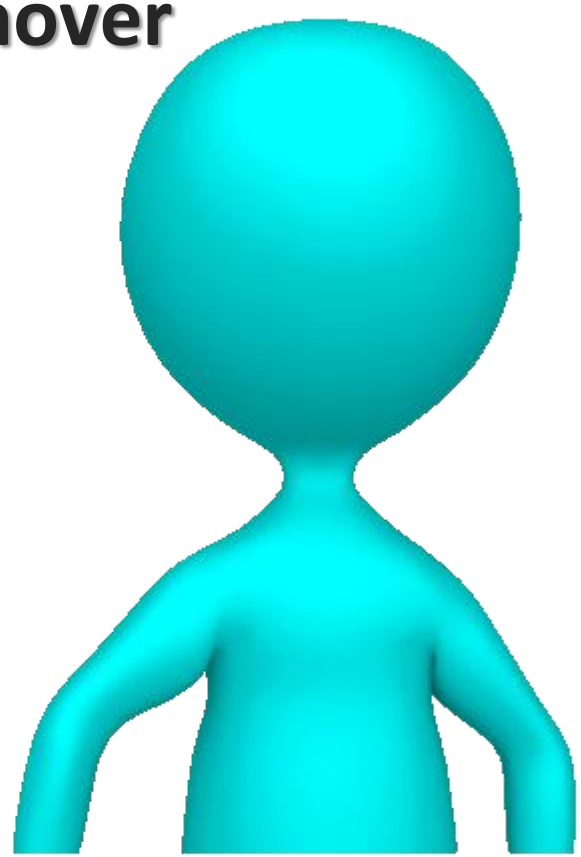
APPLE



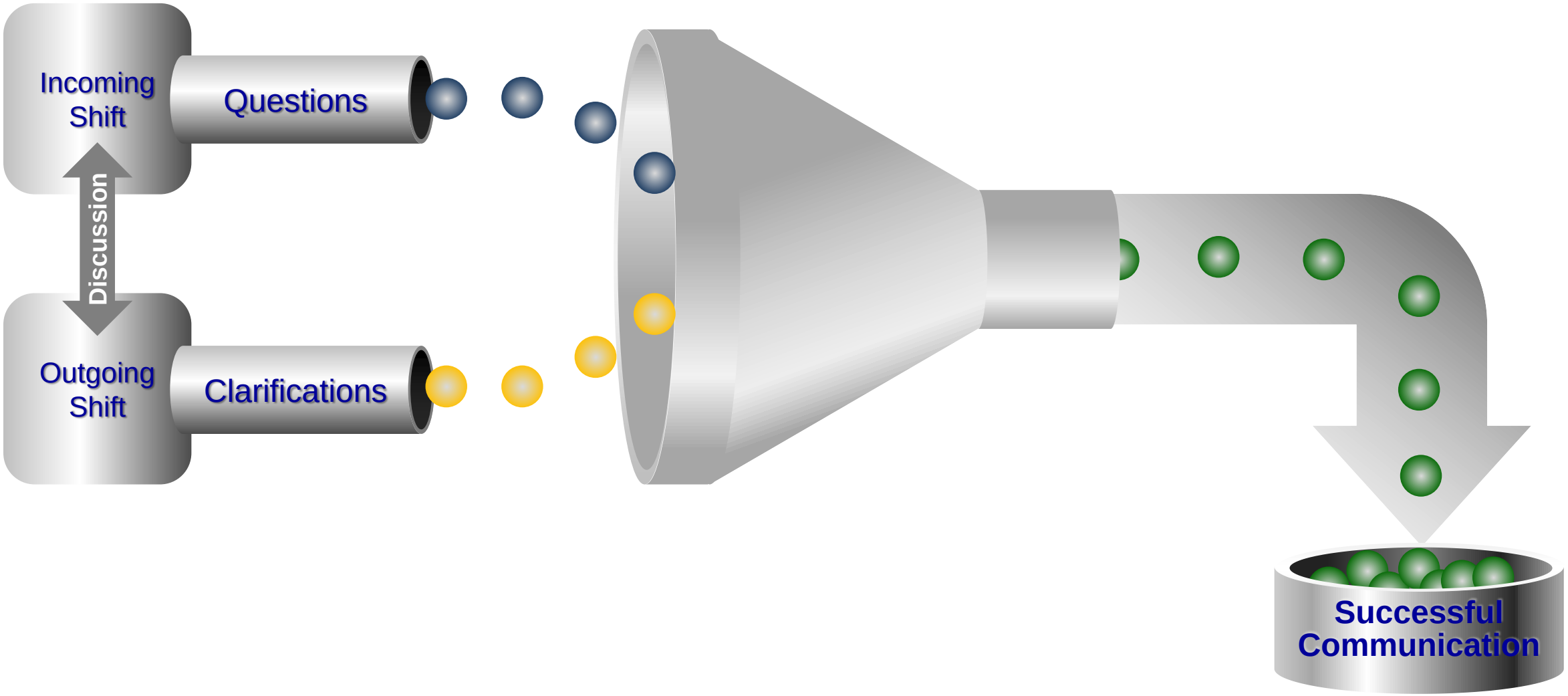
Best Practices

- ***"What would I want to know"***
- Start turnover log
  - Include not only what actions were taken, but also explain why
- Identify specific tasks the relieving operator will need to perform
- Review the turnover log / use checklists
  - Review relevant displays, documents, logs, etc.
- Transfer responsibility
  - Officially transfer responsibility for work activities from the off-going individual to the on-coming individual

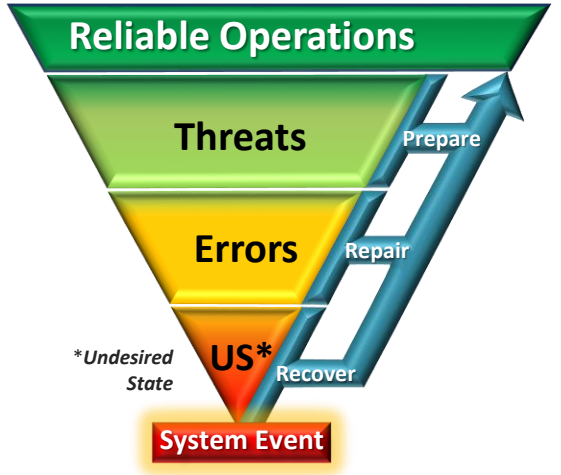
Key behaviors necessary for successful shift turnover



Key communication necessary for effective shift turnover



PJM CRM-TEM Model



Planning and Decision Making

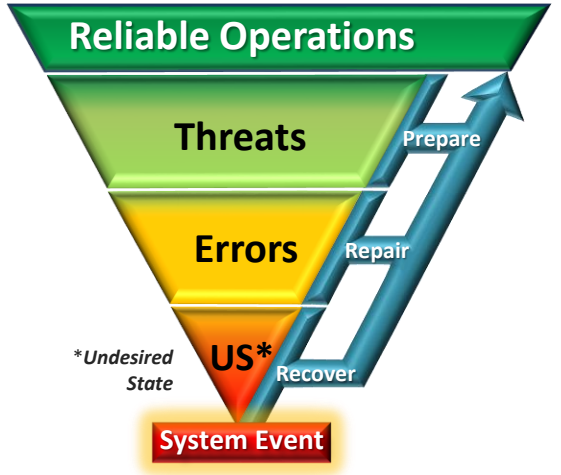
Procedure Adherence & Use Decision Making

Incorporates relevant information, develops operational strategies and chooses the best course of action consistent with safe, reliable, and efficient operations

- Use current version
- Appropriate for condition
- Follow in sequence
- Identify and correct deficiencies

- Resources
- Gather Recommendations
- Best idea
- State intentions
- “Bottom Lines”
- Resolve Conflicts

PJM CRM-TEM Model



Workload Management

Stress Management

Task Loading

Effectively manages tasks to optimize overall performance

- Anticipate
- Recognize stress
- Acknowledge confusion & realign
- Communicate calmly

- Avoid if possible
- Anticipate, get help
- Write it down
- Checklists
- Memory Prompts

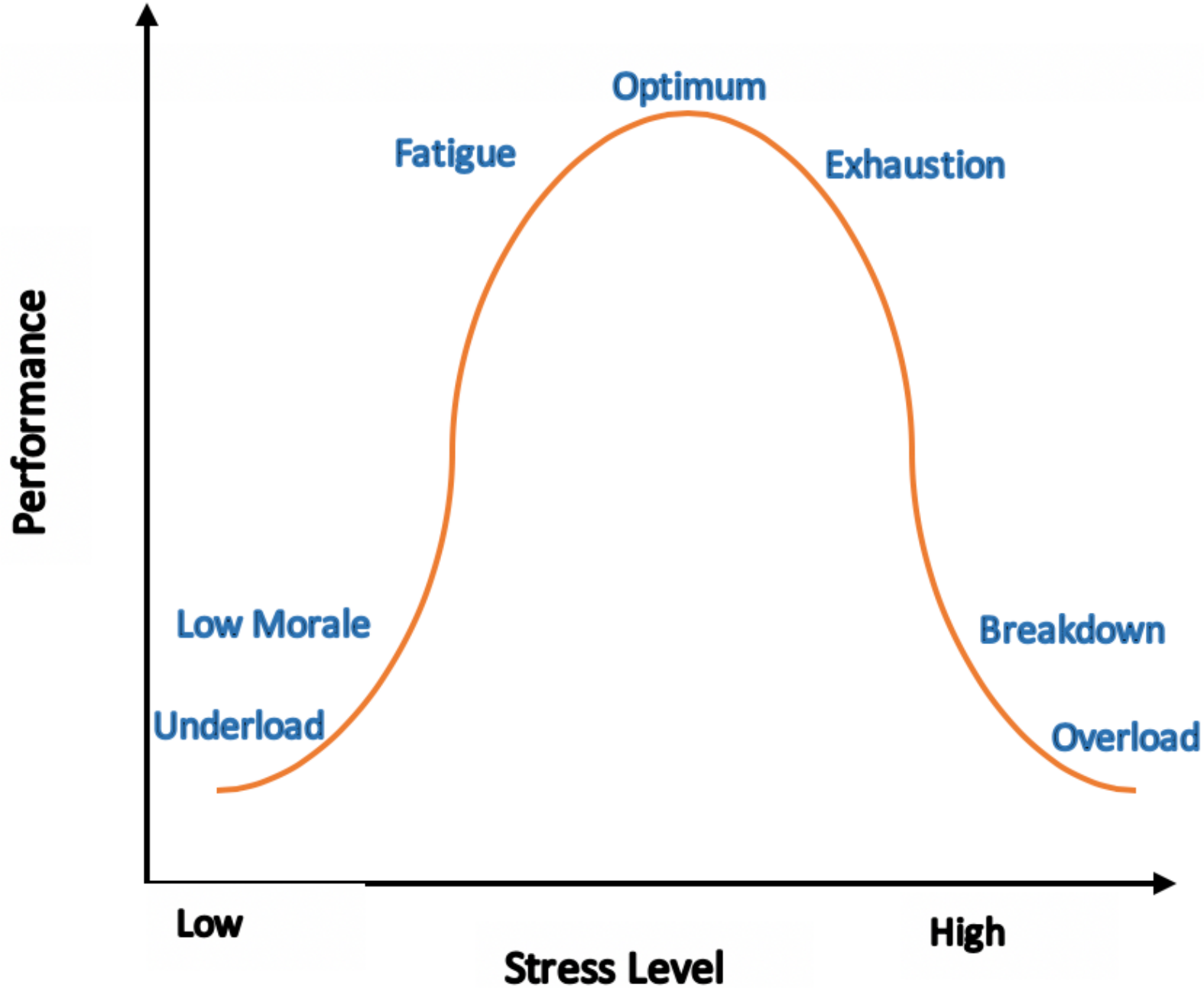
Task Loading

When multitasking:

Time required ↑

Quality of work ↓

Stress Level ↑


Optimum
Fatigue
Exhaustion
Performance
Low Morale
Breakdown
Underload
Overload
Low
High
Stress Level

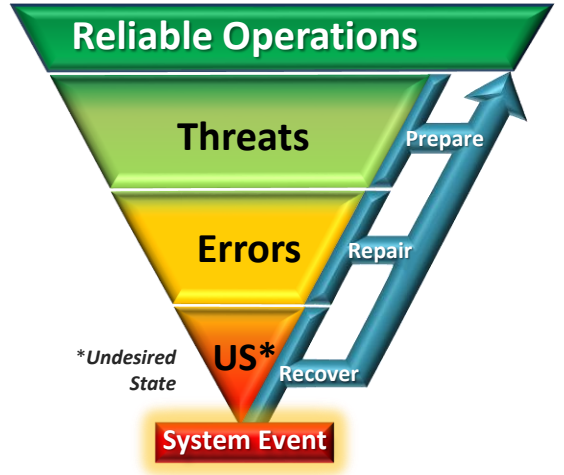
Multi-tasking Tips

What can you do on the job to eliminate the dangers of multitasking (while still doing your job effectively)

Multi-tasking Tips

1. Batch similar jobs together where possible
2. Be “mentally-present” at meetings/shift turnover/conversations
3. Put the cell phone down
4. Eliminate unnecessary distractions
5. Only check email periodically
6. Prioritize important activities
7. Write it down!
8. Be aware of the dangers of multitasking

PJM CRM-TEM Model



Monitor/Cross-Check

Checking & Verification

Self Checking

Actively verifies systems and other team member actions; resolves inconsistency and uncertainty

Self Check

STAR
- Stop
- Think
- Act
- Review

Peer Check
- Concurrent
- Independent

What's different?

Self-Checking – How is it done?

STOP

- Pause before performing a task to enhance the attention to detail

- Simple act of stopping increases the likelihood of performing the task correctly
- Attempts to eliminate any current or potential distractions before proceeding
- Especially important at *critical steps*

Self-Checking – How is it done?

THINK

- Understand what is to be done before completing a task
- Decide what contingency actions to take should an unexpected response occur

- Review information pertinent to the job
- Determine if task is appropriate for the given conditions
- Identify expected outputs/results of the action

Self-Checking – How is it done?

ACT

- Perform the correct action

Self-Checking – How is it done?

REVIEW

- Verify the result
- Take *contingency actions* as necessary

Whodunnit?

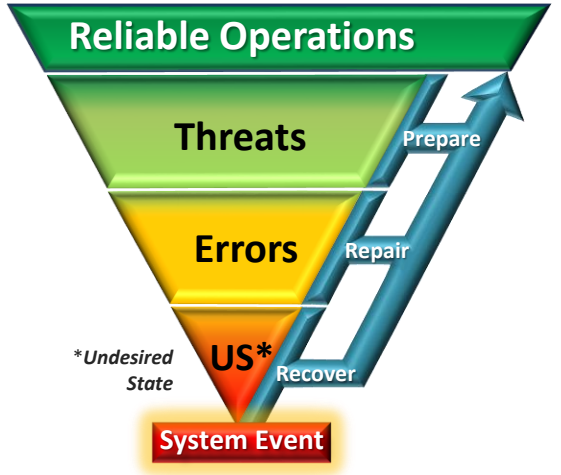
Whodunnit?

- Challenge: The human brain filters out information that it regards as unchanging –

- Vital instruments
- Critical Information

Self Check/Peer Check Exercise

PJM CRM-TEM Model



Communication

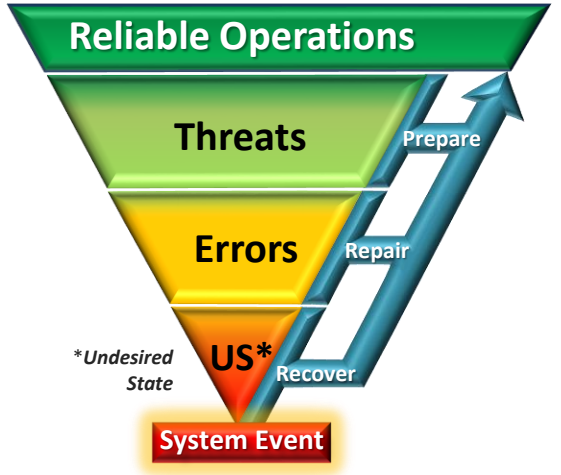
Effective Listening

PJM Communication Protocols

The exchange of ideas, information, and instructions in a clear and timely manner

- Ready
- Receive
- Review
- Respond
- Remember
- Operating Instruction
- 3 Part Communication

PJM CRM-TEM Model



Leadership Effectiveness

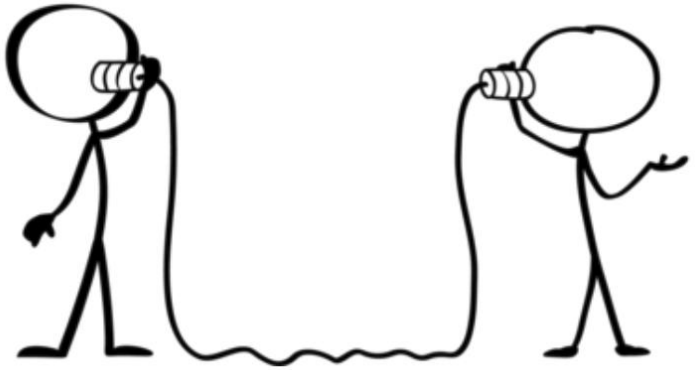
Conflict Resolution

Leadership

Effectively exercises responsibilities in a manner that promotes teamwork, professionalism, and mentoring

- Define Issue
- Communicate
- Use Open Tone
- Respect Expertise
- Assign Clear Roles
- Plan & Anticipate

Communications Review



"You Be the Auditor"

1. Listen to calls (re-recorded)
2. Review/follow transcripts
3. Audit each call individually
4. Answer assigned questions and discuss audit results in groups
5. Debrief

Communications Review

Debrief Questions

1. How would you rate the use of 3-Part Communication?
   (Consider NERC and PJM Manual 1 requirements)
2. What communication practices used in this call could be improved? How?
3. Were there any communication practices which your group members interpreted/scored differently?
4. Which CRM-TEM skills were utilized or could have been utilized during this call?

Call # 1 Transcript – "Placing Reactors in Service"

PJM Operator	Bill Smith, PJM
Member Operator	Hi Bill, Scott Lowe here at BC Power
PJM Operator	Yes.
Member Operator	I wanted to place some 230-KV reactors in the service
PJM Operator	Okay.
Member Operator	I have four of them here.
PJM Operator	Okay.
Member Operator	Southern, Hilltop, Diamond Street and Charleston.
PJM Operator	Alright. Alright, This time you can place 230KV reactors in service at Southern, Hilltop, Diamond Street and Charleston.
Member Operator	Alright, I understand I do have PJM"s permission to place into service 230KV reactors at Southern, Hilltop, Diamond Street and Charleston.
PJM Operator	Yes, that is correct.
Member Operator	Thanks.
PJM Operator	Thank you.
Member Operator	Bye

Call # 2 Transcript – “eDART Ticket Switch”

PJM Operator	**PJM, this is John Smith.**
Member Operator	Good Morning, this is George Miller at Diamond Transmission. I have and eDart ticket I’d like to switch at Central.
PJM Operator	I’m ready, can I have the number please?
Member Operator	It is E-Dart 225716, that is # 2 - 115KV transformers at Central.
PJM Operator	Alright …….# 2 the high and low side breakers?
Member Operator	That is correct.
PJM Operator	Okay you can proceed 225716 at Central - Remove from service the #2 - 115KV down to 13KV distribution transformer.
Member Operator	I copy, I have permission from PJM under eDart 225716, to switch out # 2 - 115KV transformer at Central.
PJM Operator	That is correct.
Member Operator	Alright, Thank you
PJM Operator	Thanks.

Call # 3 Transcript – "Proceed with Outage"

Member Operator	**X Energy, this is Kris.**
PJM Operator	Kris, Douglas at PJM
Member Operator	Yes, sir.
PJM Operator	For E-Dart 225746, I ran a study removing the 138KV A-91 Firestone-Gate. No issues, you can go ahead and proceed with that outage.
Member Operator	I understand we have PJM's permission then to proceed with removing from service the Firestone-Gate line.
PJM Operator	All correct.
Member Operator	Alright, Thank you sir.
PJM Operator	Thank you, Bye.
Member Operator	Talk to you later, Bye.

Call # 4 Transcript – "eDART Study"

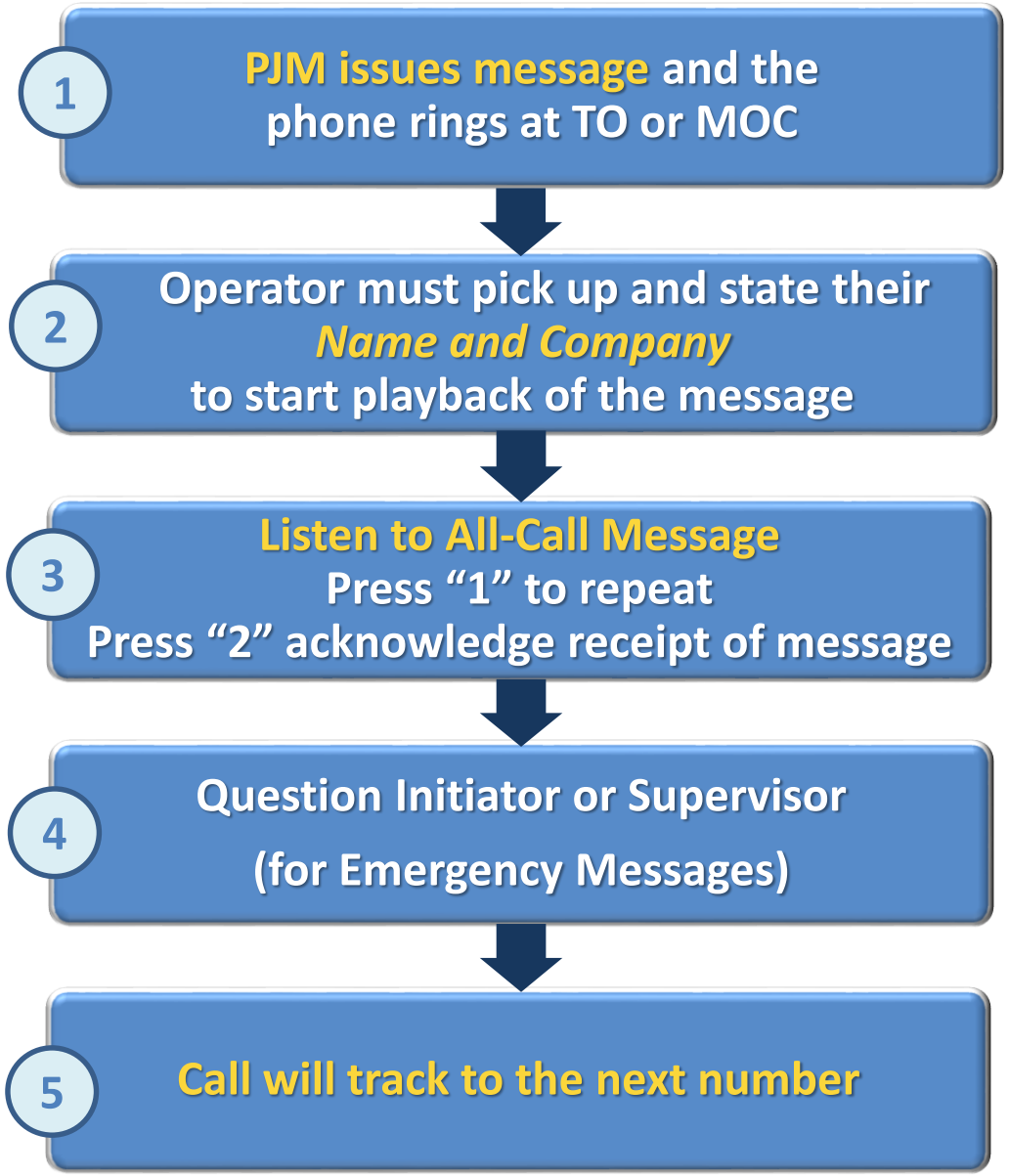
Member Operator	**CBC this is Mike Smith.**
PJM Operator	Hey, Mike. Bob Power at, PJM.
Member Operator	Yes, sir.
PJM Operator	I ran a study on your eDart ticket restoring the #2 138KV bus with exception the X1 transformer which will remain out under another eDart ticket. I'm not seeing any issues you can start that work.
Member Operator	So we have PJM permission to restore the # 2 138KV bus with exception of a -well everything else that's out on # 2 138KV bus with the exception of the X1 transformer which in fact cleared under another eDart ticket.
PJM Operator	Correct.
Member Operator	Out-of-service under another E-Dart.
PJM Operator	Correct.
Member Operator	Alright I appreciate it, Mike.
PJM Operator	Alright, No problem. Thanks, Bye.
Member Operator	Bye.

PJM All-Call Process

PJM All-Call Process

- The PJM All-Call process is a one-way communication system used to send messages to member companies
- PJM All-Call messages are issued during both normal and emergency conditions
- PJM Member Control Centers are required to have a dedicated line for the primary All-Call number

Receiving PJM All-Call Messages



Message Categories

There are 3 categories for All-Call Messages:

- Operational
- Informational
- Emergency Procedures

Message Categories

Operational Messages	
General Information	GD, MD, MC or SS depending on message
General Dispatch	Generation Dispatcher
Gen Checkout	Master Coordinator
500 kV and Above Switching	Master Dispatcher
Instantaneous Reserve Checks	Generation Dispatcher
Off SCED Control	Generation Dispatcher
Geo-Magnetic Disturbance Information	Generation Dispatcher
Initiating Time Correction	Generation Dispatcher
Regulation Requirements	Master Coordinator

* General Dispatch includes calling a unit on, taking a unit off, or adjusting a generator's output

Message Categories

Message Categories

Emergency Messages	
Emergency Alerts, Warnings, and Actions	GD, MD, MC or SS depending on message
Minimum Generation Information	Master Coordinator or Generation Dispatcher
Synchronized Reserve Activations	Generation Dispatcher

Questions?

PJM Client Management & Services

Telephone: (610) 666-8980

Toll Free Telephone: (866) 400-8980

Website: www.pjm.com

The Member Community is PJM's self-service portal for members to search for answers to their questions or to track and/or open cases with Client Management & Services

Resources & References

PJM. (2019). *PJM Manual 1: Control Center & Data Exchange Requirements (rev. 40)*. Retrieved from https://www.pjm.com/-/media/documents/manuals/m01.ashx