The Future is Here: Observations About Our Science & Practice…

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This Morning…

- Share some **observations** on our science, practice & profession…
  - After a journey of 30 years…
  - Stories…
  - Team science…
- Offer some **food-for-thought**…
- **Challenge** you -- to **ENGAGE!**

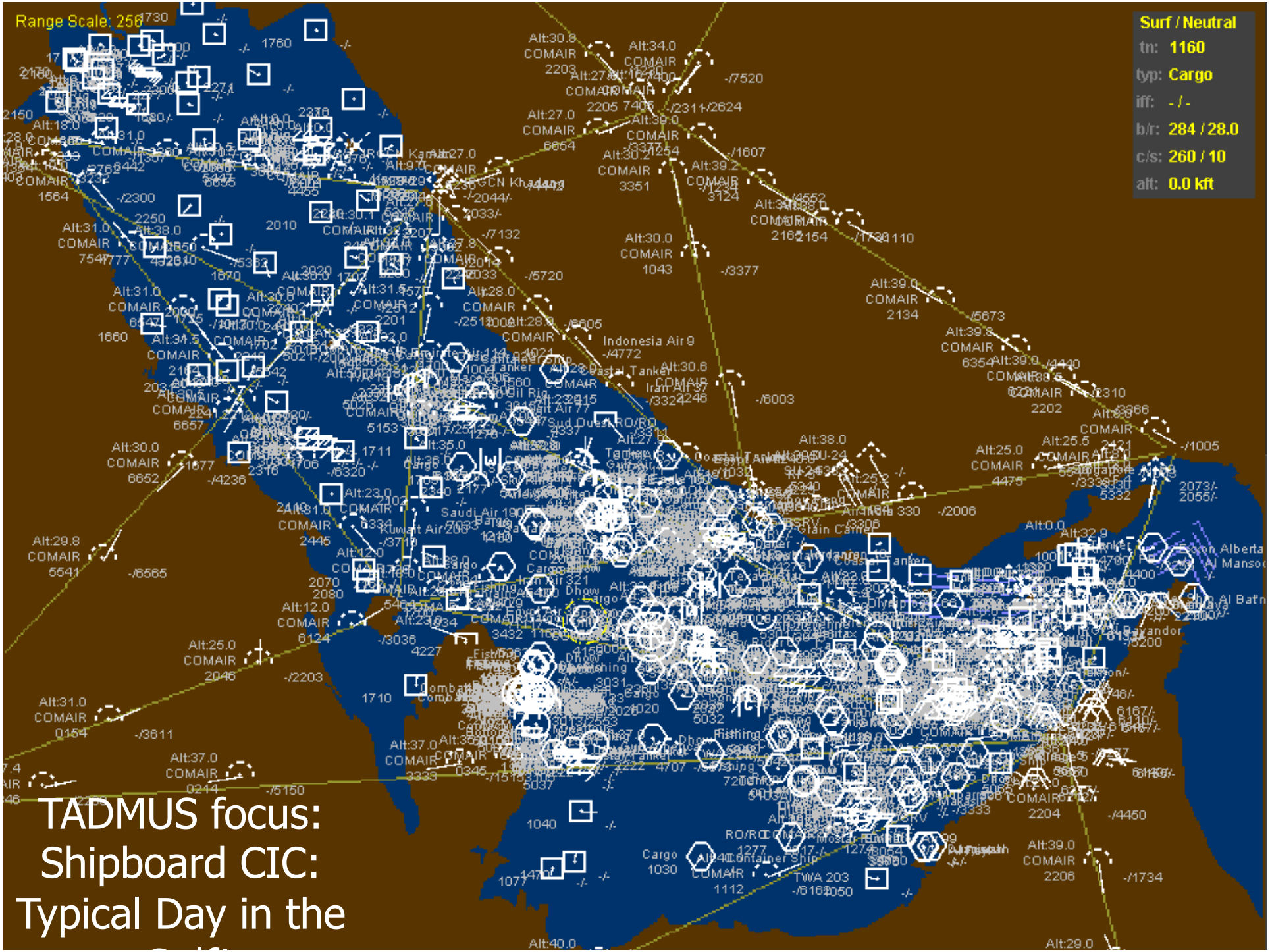
Story 1

TADMUS

- USS Vincennes shoots down Iranian airliner, 1988
  - Well trained team.
  - Lack of understanding regarding information and perspectives resulted in catastrophic consequences.
  - Office of Naval Research launches:
    - Tactical design making under stress (TADMUS) project
    - 10 year program

TADMUS

- TADMUS Goals:
  - Better understand tactical decision-making in naturalistic environments
  - Mitigate the effects of stress in teams
    - Simulation and training principles
    - Team performance
    - Team training


Range Scale: 256
Surf / Neutral
tn: 1160
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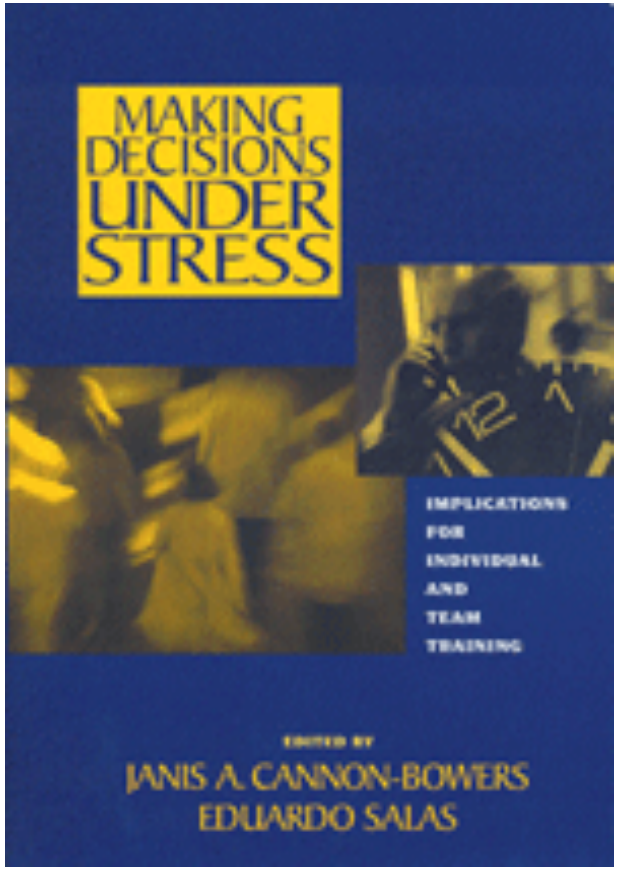
TADMUS focus:
Shipboard CIC:
Typical Day in the

Driving Question…

- How do we turn a team of experts into an expert decision-making team?
- Research Approach:
  - Theoretically-Driven
  - Study Teams In Natural Settings
  - Experts As Participants
  - Laboratory Experiments When Appropriate
  - Balance Science And Practice
  - Product Oriented

Impact…



- Compared with current training, enhanced training resulted in (see Cannon-Bowers & Salas, 1998)
  - 45% improvement in mission performance
  - 33% improvement in tactical decision-making performance
  - 25% improvement in communication efficiency
  - 10-34% improvement in team coordination

Story 2

Aircrew Coordination

- 60-80% accidents due to human error
- Improve safety & mission performance

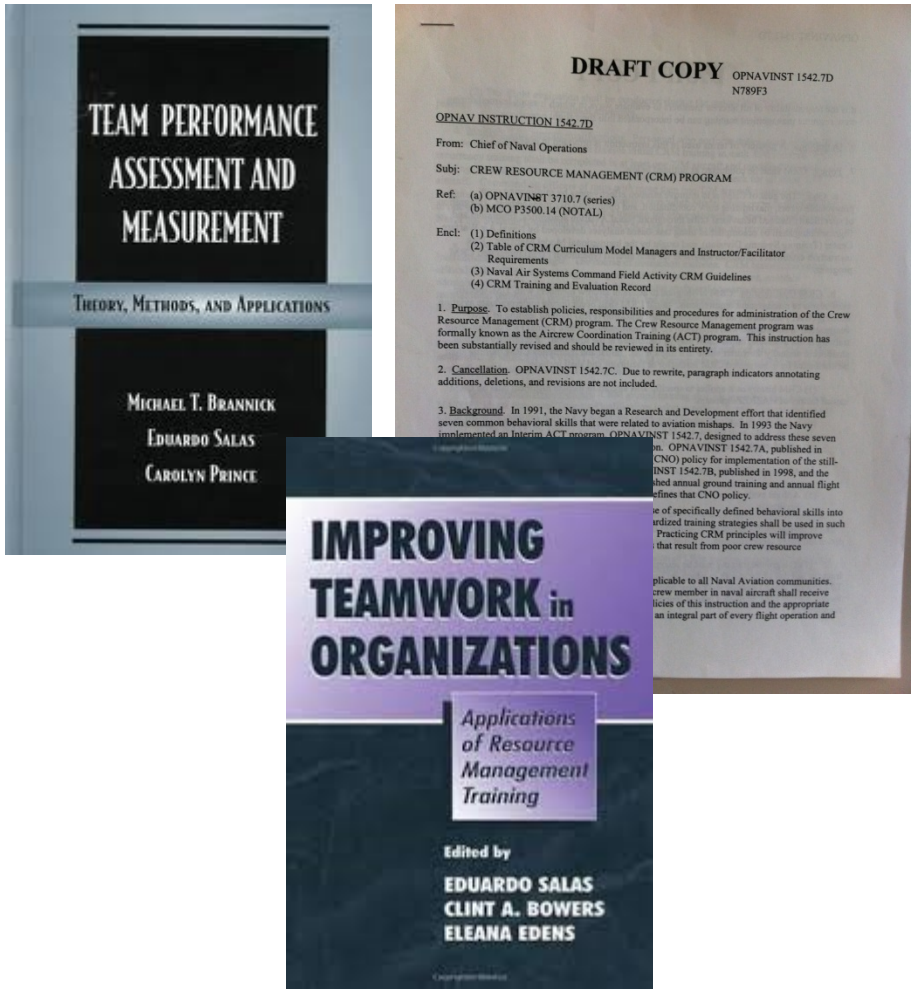
Aircrew Coordination Training R&D

- Approach:
  - Designed & developed a training program
  - Validated, skill-based
  - Integrated, Navy-relevant
  - Focus on safety, mission performance
  - Stand-alone

Impact…

- Over **2400** aviators participated, got trained, across 6 platforms.
- 3 validation studies: **6-20%** improvement in team behaviors, safety (with experts).
- **CRM school created**, over see delivery of team training.
- **Navy-wise** implementation.

Impact…



- Guidelines & Specifications
- Naval Instruction (1992)
  - Valid today(!)
- **D**ecision Making
  Assertiveness
  Mission Planning
  Communication
  Leadership
  Adaptability/Flexibility
  Situation Awareness

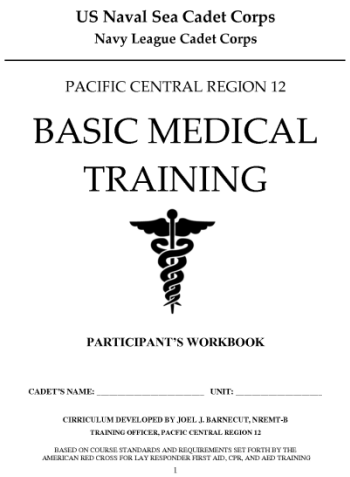
Story 3

Explosive Ordinance Disposal…

- Improve team decision-making, team leadership
- Ameliorate stress effects on teams
- Accelerate expertise
  - Team dynamics

Explosive Ordinance Disposal…

Impact…


US Naval Sea Cadet Corps
Navy League Cadet Corps

PACIFIC CENTRAL REGION 12

BASIC MEDICAL TRAINING

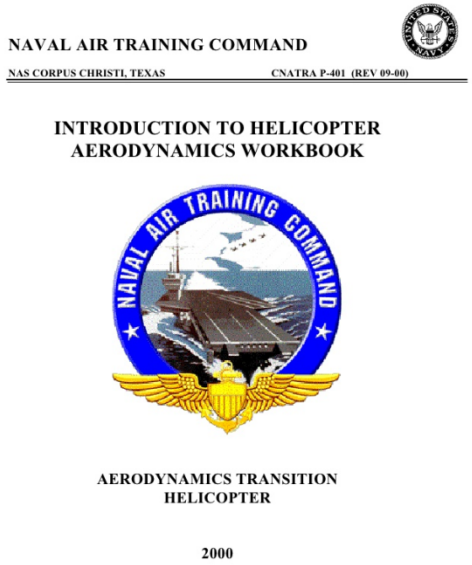
PARTICIPANT'S WORKBOOK

CADET'S NAME: _____ UNIT: _____

CIRRICULUM DEVELOPED BY JOEL J. BARNECUT, NREMT-B
TRAINING OFFICER, PACIFIC CENTRAL REGION 12

BASED ON COURSE STANDARDS AND REQUIREMENTS SET FORTH BY THE AMERICAN RED CROSS FOR LAY RESPONDER FIRST AID, CPR, AND AED TRAINING

1


NAVAL AIR TRAINING COMMAND

NAS CORPUS CHRISTI, TEXAS CNATRA P-401 (REV 09-00)

INTRODUCTION TO HELICOPTER AERODYNAMICS WORKBOOK

NAVAL AIR TRAINING COMMAND

AERODYNAMICS TRANSITION HELICOPTER

2000

- Science-based advice
- Developed curriculum
- Created scenarios
- Provided instructor checklists & observation protocols
- **Use** in **training today**

Story 4


H
Hospital

TeamSTEPPS™…

- Institute of Medicine Report…
  - Impact of Error:
    - 44,000-98,000 annual deaths occur as a result of errors
    - Medical errors are the leading cause, followed by surgical mistakes and complications
    - More Americans die from medical errors than from breast cancer, AIDS, or car accidents
    - 7% of hospital patients experience a serious medication error

Federal Action:

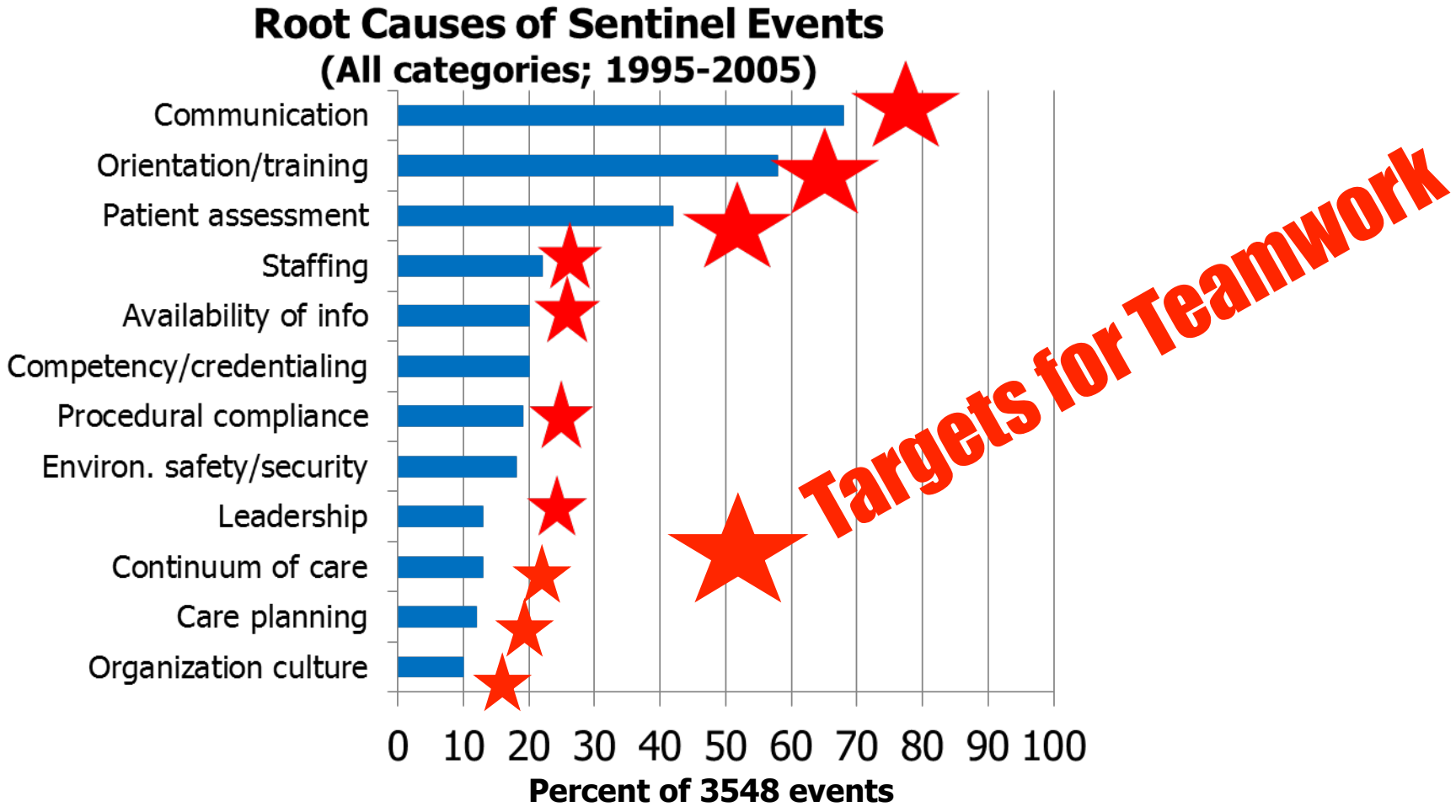
By 5 years;

- ⬇ medical errors by 50%,
- ⬇ nosocomial by 90%; and eliminate "never-events" (such as wrong-site surgery)

Cost associated with medical errors is $8-29 billion annually.

TeamSTEPPS™...

Joint Commission Sentinel Events



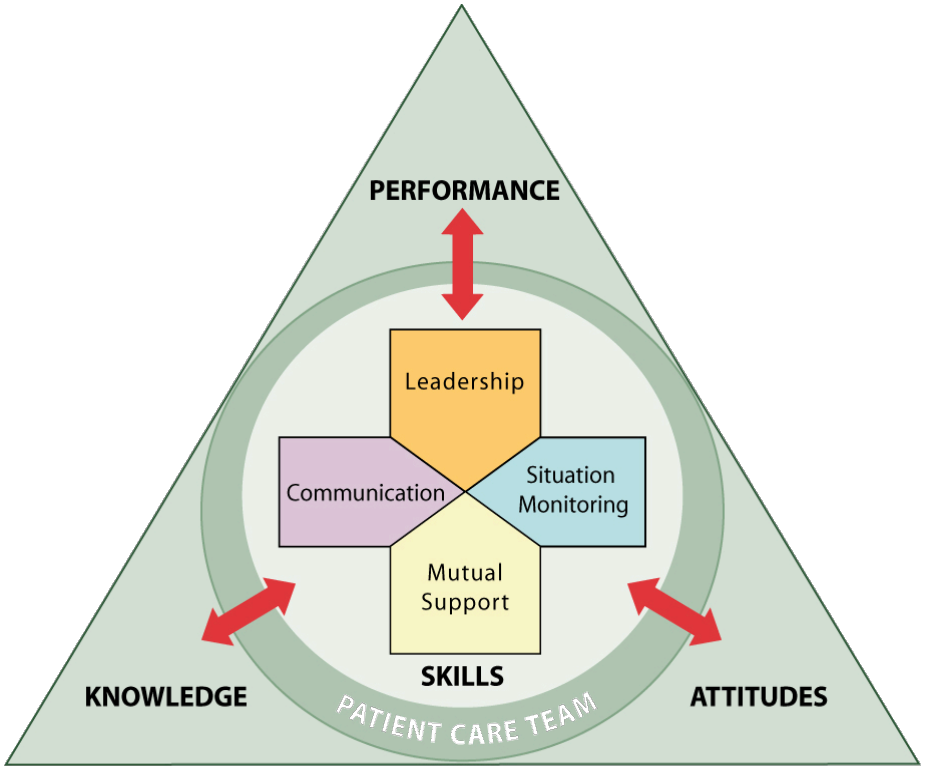
TeamSTEPPS

Team Strategies & Tools to Enhance Performance & Patient Safety

- ✓ Grounded in team performance research
- ✓ Applies teamwork principles and strategies that are teachable and learnable
- ✓ Field tested
- ✓ Comprehensive
- ✓ Customizable
- ✓ Evaluation Tools
- ✓ Ready-to-use
- ✓ Available to your organization

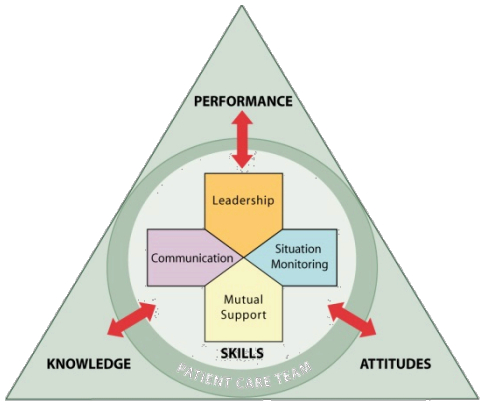
TeamSTEPPS™...

- **Knowledge**
  - Shared Mental Model
- **Attitudes**
  - Mutual Trust
  - Team Orientation
- **Performance**
  - Adaptability
  - Accuracy
  - Productivity
  - Efficiency
  - Safety



TeamSTEPPS™: Learning Strategies…

- **Information**
  - Evidence-based knowledge creates awareness
- **Demonstration**
  - Video vignettes and case studies
- **Practice**
  - Role-play, Tools, Problem Solving, Practice (simulation)
- **Feedback**
  - Debrief, Networking, Measures
- **Remediation**
  - Coaching, Continuous Improvement



Impact…

- **220** DoD healthcare facilities use it
- AHRQ: **20-30%** US **hospitals** use it
- Over **5,000** formally trained through national implementation programs, much more informally
- Data: Improved efficiency in clinical processes
  - L&D, Trauma, Surgery
  - Reduction in PS events
    - **83% reduction** in **medication errors**
    - VA study
      - **18% reduction** in **mortality**

Story 5

Human Factors…

- Editor, 2000-2004
  - 500+ Action letters
- Executive Council
- President, 2012-2013
- Several TG Leadership Positions
- Active in HFES for 30 years

Human Factors…

- DoD Science & Technology R&D, down…
- Open Access…
- Student motivations, intentions – Different
- HFES membership getting older…
- Others…

Common Themes…they impact when…

- A **Mandate** – A problem to be solved
- **Resources** available
- **Access** to experts, observations in context
- **Science**, data, experiments, studies
- **Practical deliverables**, tools, advice, principles
- **Customers** buy in, support

Observations…

1. **Embedded** ourselves in the **context**
   - Goes to our motivation
   - Observations, interviewed, deployed
2. Focused on **human performance** (Team dynamics)
   - Understand it
   - What variables matter
3. **Informed** by **theory**

Observations…

4. Invested in **measurement** strategies
5. **Urgency** in data collection, field
   - Show sponsor, fleet…
6. **Surrounded** ourselves with "**critics**"
   - Advisory boards
   - Challenged us, motivated us
7. Keen eye on **deliverables**
   - Products
   - Scientific & practical

Observations…

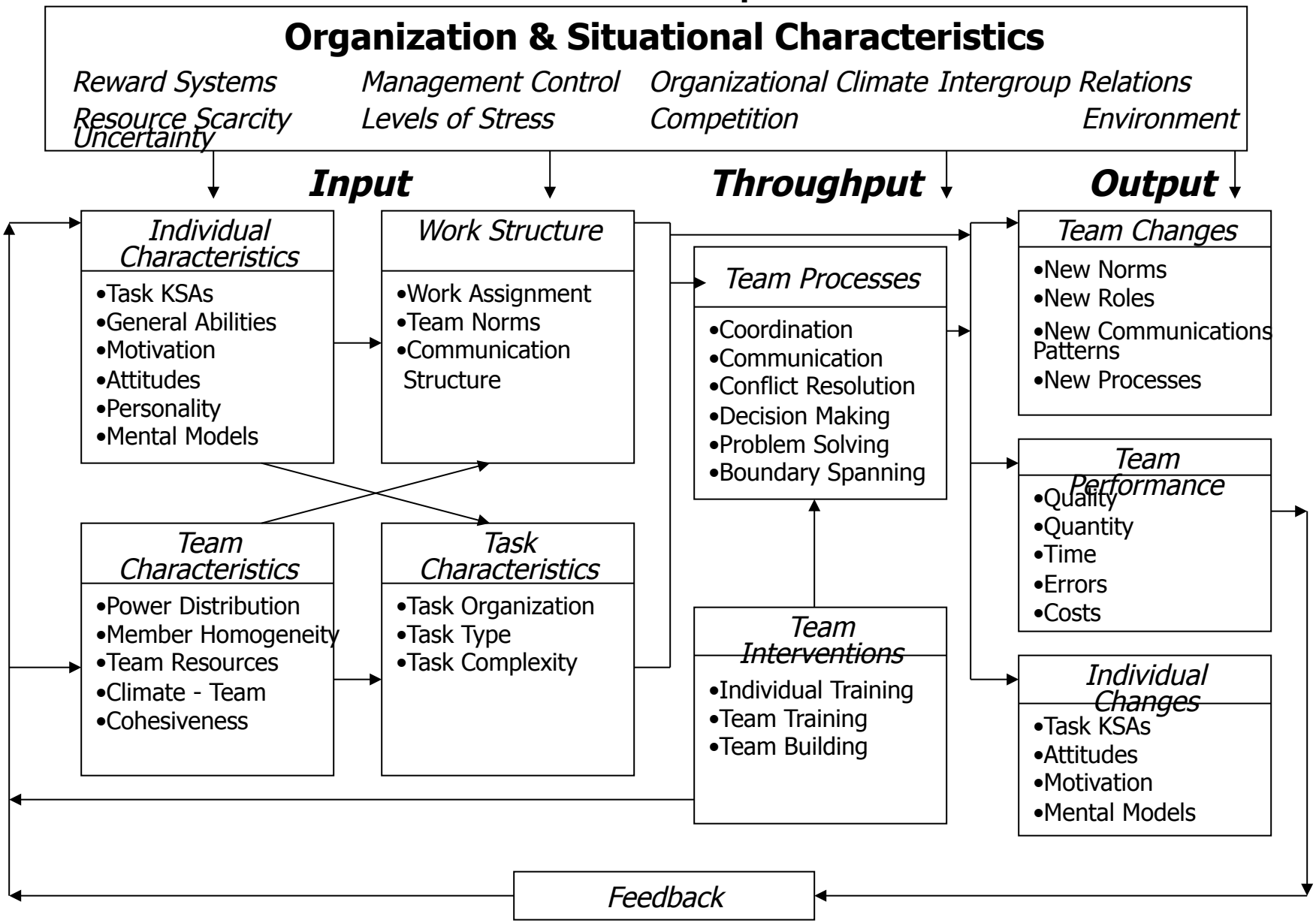
8. We **divided** & **conquered**
   - Messy work vs. lab, science vs. practice
9. "**Methods**", our partner
   - Internal/external validity
10. We learned to be "**story tellers**", **translations**!

“**Changed peoples minds**”…

See things differently about team dynamic, training, measurement, leadership

A Few Lessons Learned About Team Science

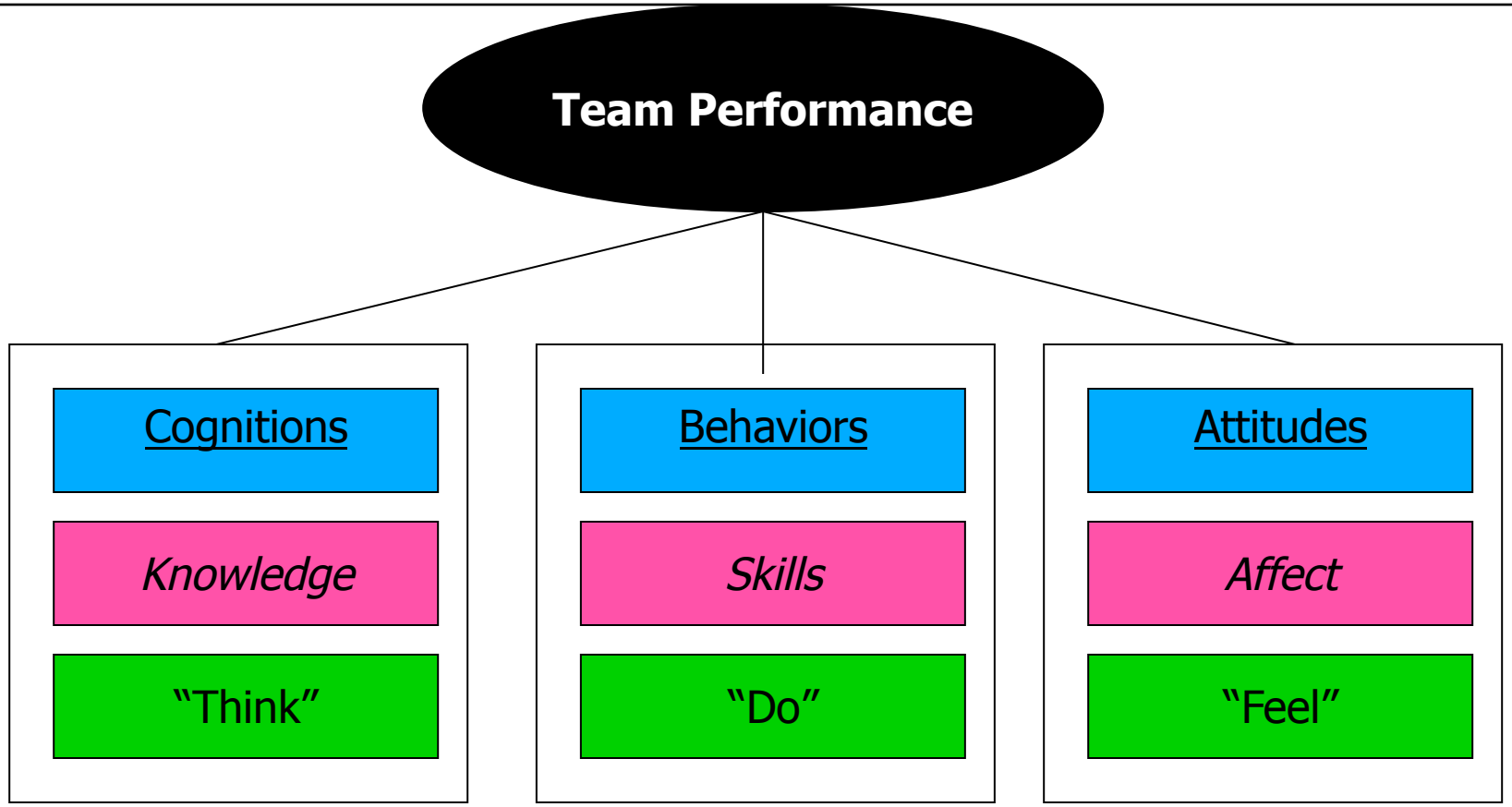
Lesson 1: Teamwork Is A Complex Phenomena...



Lesson 1: Yes, But…

- Theories Abound!
  - 150 plus, few validated
- IPO approach dominates
- Context matters!
- Need more parsimonious, powerful "theoretical engines", few variables
- New forums of team dynamics emerging, new constructs needed (?)

Lesson 2: Team Performance Is Comprised of Cognitions, Behaviors, and Attitudes…



Lesson 2: Yes, But…

- Questions remain:
  - **Right mixture**?
  - What KSAs lead to **adaptation** & **resilience**?
  - How these **evolve** & **mature** over time?
- **Deeper** examination needed
  - Communication flow, patterns
- **New forms** of teams emerging:
  - What KSAs are needed?

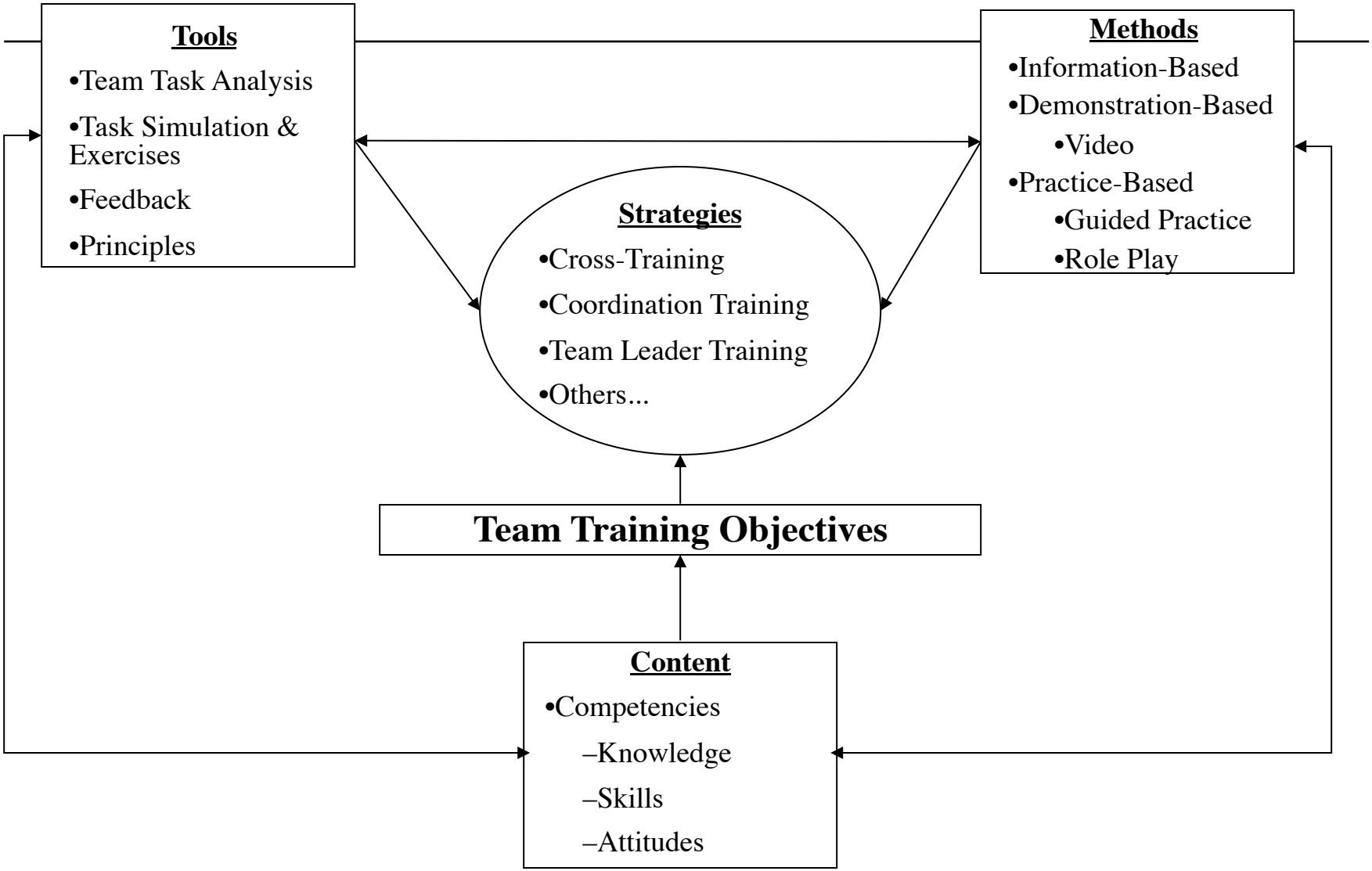
Lesson 3: Measurement Tools Need To Be Multi-Faceted...

	Individual	**Team**
PROCESS	–Decision Flow Analysis –Performance Diary –Observation Analysis	–Observational Scales –Content Analysis –Critical Incidents
OUTCOME	–Critical Incidents & Latency –Automated Performance Recording –Expert Opinion	–Rating Scales –Team Error Analysis –Archival Data

Lesson 3: Yes, But…

- **Progress!**; Not perfect…
- **Labor intensive**…
- Communications data analysis, improving…
- Observation protocols, robust…
- Self-report, dominates…
- **No "silver bullet"**…
- Measure for **meaning**, not for marks…
- **Process** measures, better for training…

Lesson 4: Team Training Works!



Lesson 4: Many Strategies…

- Cross-Training
  - Walking in Each Others' Shoes…
- Stress Exposure Training
  - Better the Devil You Know…
- Team Coordination Training
  - He Ain't Heavy…
- Team Leader Training
  - Setting the Stage…
- Team Self-Correction
  - Replay in the Bar..

Lesson 4: Yes, But…

- Bottom line: It's about competencies…
- Data compelling…
  - **20%** improvement
- Need "**deeper dive**":
  - What, When, How
  - Role of practice, simulation
  - How transportable? Dosage?
  - Intelligent team training tutoring
- Era of **Debriefs**…
  - 25% performance improvement

Lesson 5: We know a lot about what works in teams…

- It's about **clarity** of **roles** & responsibilities…
- Having a **compelling purpose**…
- Appropriate team **launch**…
- A team c**oach** (leader)…
- Holding a **shared understanding**…
- They **self-correct**…
- Optimal **organizational conditions**…

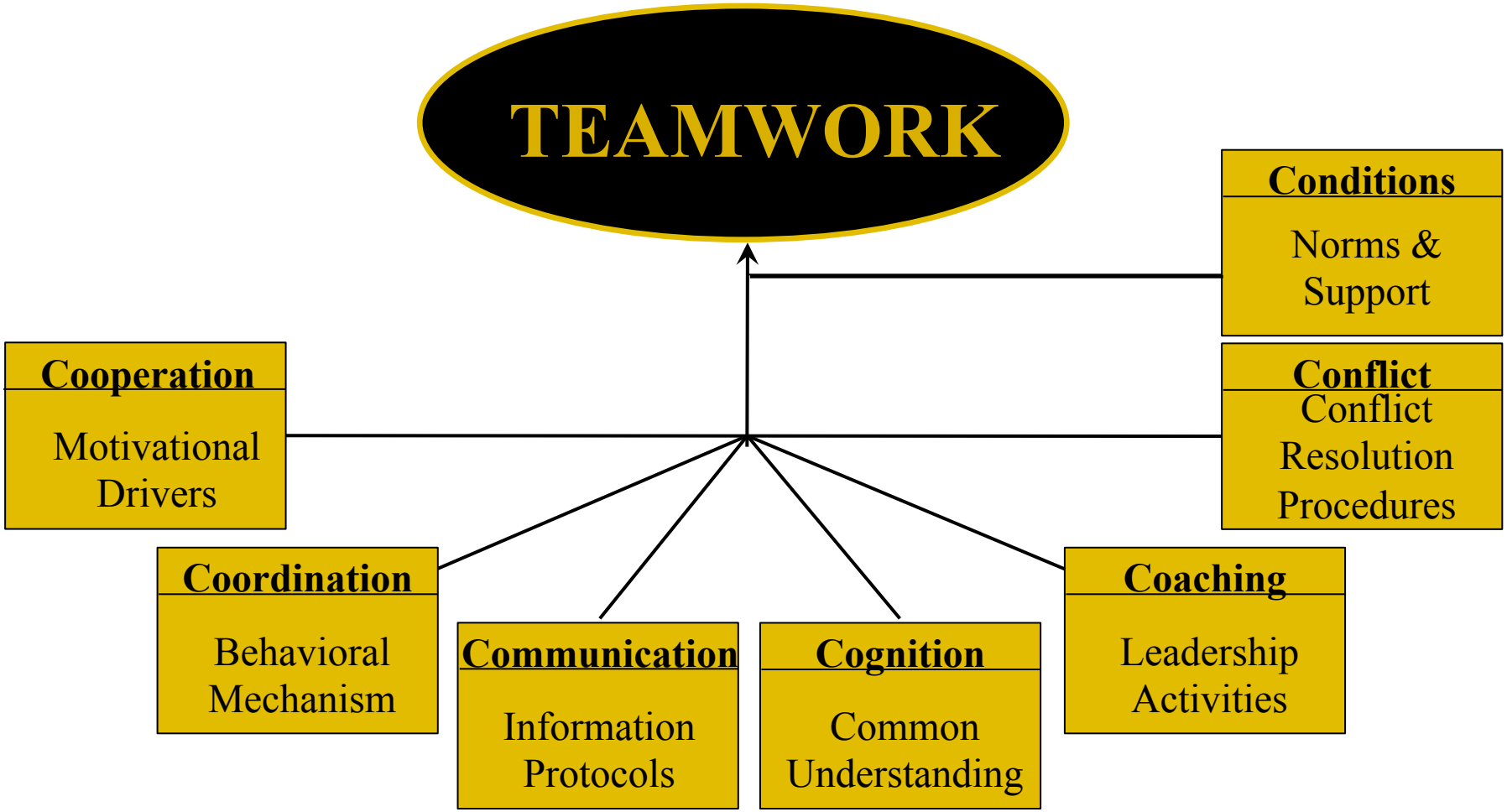
Lesson 6: Not all work teams are created equal…New emerging

- Moved from "bounded action" teams to "fluid knowledge seeking" teams…
- Long duration, isolation…
  - "Going to Mars"
- Human-robot teams…
- New manufacturing teams…
  - Automation & robots as teammates
- Teams of teams…
- New constructs, new paradigms…

Lesson 7: The study of work teams is a multidisciplinary activity…

- …takes a village…
- Reach out!
- No science discipline owns team science!
- We can learn from sports, coaches, CEO's, NASCAR, Formula 1…

Lesson 8: Translations & practical heuristics, matter…



Lesson 9:

When we all work together, when we share responsibilities and share leadership –

Success Comes!

Lesson 10: Our Future Must…

- **Energize ourselves!**
- **Engage!**
- **Educate!**
- **Embrace!**
- **Enjoy!**

HF Science Matters When…

- **Guided** by **theory**
- **Balanced** lab & field studies
- **Human performance** focused
- **Data-driven**, **evidence-based**
- **Multi-disciplinary** perspectives
- **Translate**

HF Science Impact…

- **Saves lives**…
- Good to our **economy**, **national security**…
- **Productivity**, **retention**, **satisfaction** in the work place…

So, **ENGAGE!**

When in Orlando…

Thank you so much!