



# Air Vehicle Design

## AOE 4065 – 4066

### *III. Project Management Topics*

#### Course Module P4

#### Project Execution: *Teamwork for Success*

Kevin T. Crofton Department of Aerospace and Ocean Engineering  
Blacksburg, VA



### Overview of AVD Courses

#### I. Foundational Elements

- F1. Design: *An Engineering Discipline*
- F2. Systems and Systems Thinking
- F3. Basics of Systems Engineering
- F4. Decision Making with Ethics and Integrity

#### II. Air Vehicle Design Fundamentals

##### A1. Purpose & Process

##### Conceptual Design

- A2. Understand the Problem
- A3. Solve the Problem
- A4. Initial Sizing: *Takeoff Weight Estimation*
- A5. Initial Sizing: *Wing Loading and Thrust Loading Estimation*
- A6. Cost Considerations
- A7. Concept to Configuration: *Key Considerations*
- A7A. Configuration Layout: *Drawings & Loft*

##### Conceptual & Preliminary Design

- A8. Trade Studies
- A9. Use of Software Tools
- A10. Preliminary Design: *Baseline Design Refinement & Validation*

#### III. Project Management Topics

- P1. Basics of Project Management and Project Planning
- P2. Project Organization
- P3. Roles & Responsibilities of Team Members
- P4. Project Execution: *Teamwork for Success*
- P5. Project Risk Management
- P6. Delivering Effective Oral Presentations
- P7. Writing Effective Design Reports

## **Disclaimer**

*Prof. Pradeep Raj, Aerospace and Ocean Engineering, Virginia Tech,  
collected and compiled the material contained herein from publicly  
available sources solely for educational purposes.*

*Although a good-faith attempt is made to cite all sources of material,  
we regret any inadvertent omissions.*

## **CRUCIALLY IMPORTANT**

***CMs only introduce key topics and highlight some important concepts and ideas...but without sufficient detail.***

***We must use lots of Reference Material\* to add the necessary details!***

***(\*see Appendix in the Overview CM)***



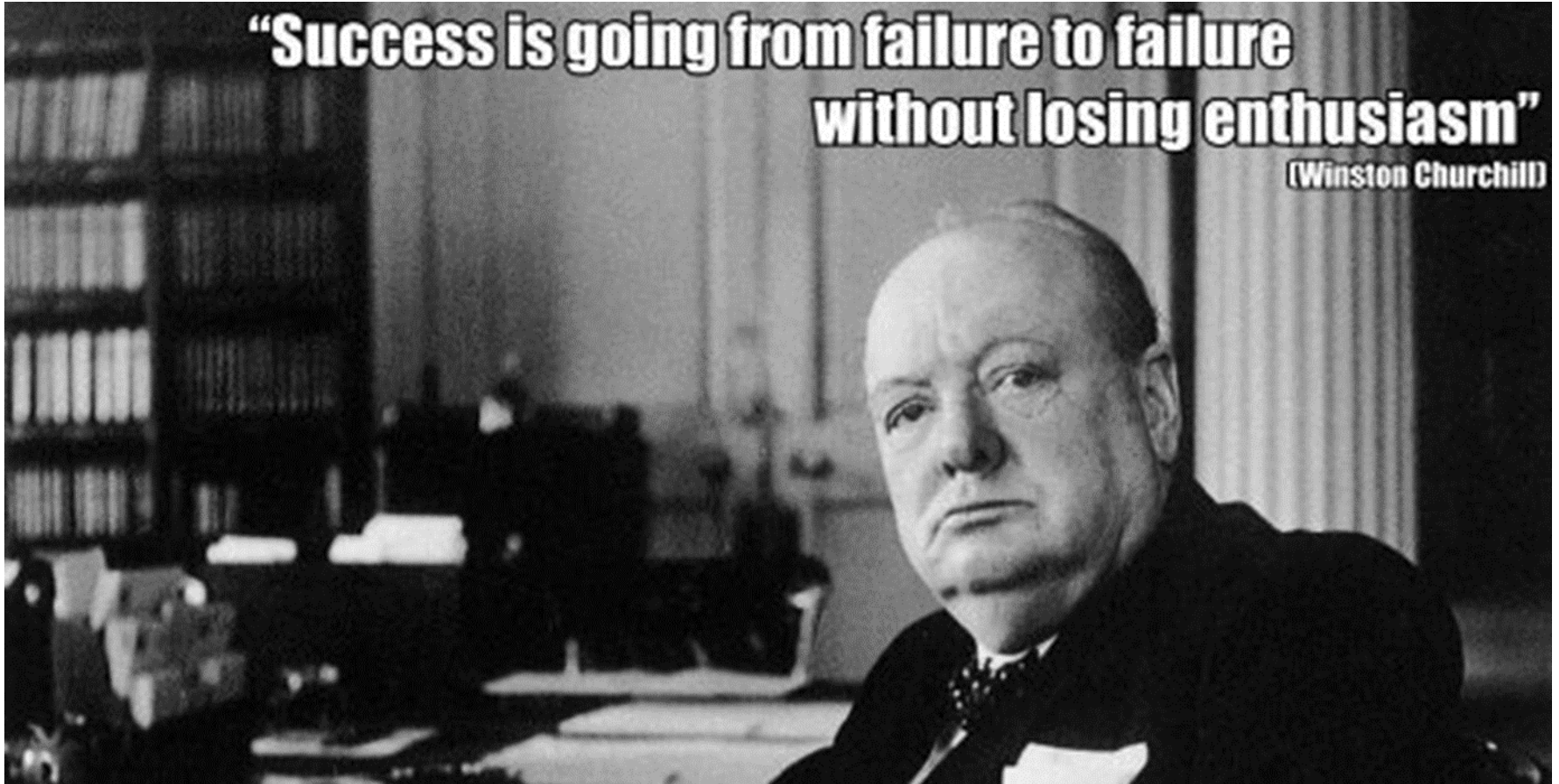
# Outline

## **P4. Project Execution: *Teamwork for Success***


**P4.1 What is Success?**

**P4.2 What is Teamwork?**

# What is Success?



# What is Success?



*What is success?  
I think it is a mixture of  
having a flair for the  
thing that you are doing;  
knowing that it is not  
enough, that you have  
got to have hard work  
and a certain sense of  
purpose.*

*Margaret Thatcher*

# What is Success?

***Success is the result of perfection,  
hard work, learning from failure,  
loyalty, and persistence.***

***A dream doesn't become a reality  
through magic; it takes sweat,  
determination and hard work.***

***There are no secrets to success.***

*Gen. Colin L. Powell*

*65<sup>th</sup> U.S. Secretary of State, 2001-2005*

*12<sup>th</sup> Chairman of the Joint Chiefs of Staff, 1989-1993*

*16<sup>th</sup> U.S. National Security Advisor, 1987-1989*



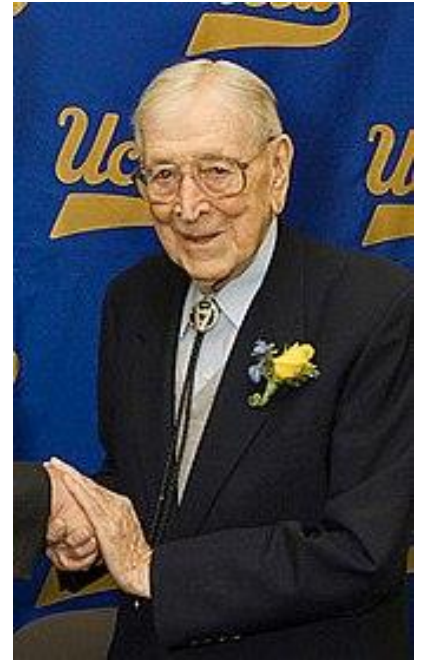


# What is Success?

**“I coined my own definition of success,  
which is *peace of mind attained  
only through self-satisfaction in knowing  
you made the effort to do the best  
of which you’re capable.*”**

*John Wooden*

*UCLA Bruins Basketball Coach, 1958-1975  
10 NCAA Championships in his last 12 years*



*14 Oct 1910 – 4 Jun 2010*

## Wooden’s Timeless Advice

- Always be on time.
- Be neat and clean.
- Don’t use profanity.
- Never criticize a teammate.
- Have patience.
- Have faith that things will work out if we do what we are supposed to do.
- Don’t whine, complain or make excuses.
- Do your best.

***“Knowing you did the best of which you’re capable!”***

# Measure of Success of Team Effort

## *Winning!*



**Winning isn't everything,  
but wanting to win is.**

**Winning is habit.  
Unfortunately, so is losing.**

*Vince Lombardi*  
*Green Bay Packers Coach, 1959-1967*

***Do your level best...only best things will follow!***

# Winning as a Team

In “real” life, there are NO points for 2<sup>nd</sup> place!

**Winning isn't everything.  
It's the only thing!**

*Henry Russell ("Red") Sanders  
UCLA Bruins Football Coach, 1949-1957*



**For the Capstone Air Vehicle  
Design projects,  
it's like the 'Olympics'**



**What does it take to be a winner? Teamwork!**



# Outline

## **P4.0 Project Execution: *Teamwork for Success***

P4.1 What is Success?

**P4.2 What is Teamwork?**

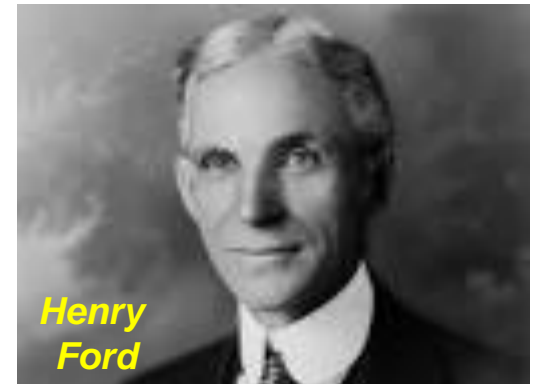
# Teams Usually Characterized by “Working Together”



People who **work together** will win,  
whether it be against complex  
football defenses, or the problems  
of modern society.

*Vince Lombardi*  
*Legendary Green Bay Packers Coach, 1959-1967*

***Coming together is a beginning.  
Keeping together is progress.  
Working together is success.***



# 'Teamwork' is More Than Just *Working Together*

- For a Air Vehicle Design project, all team members *working together* on the *same problem is not* Teamwork!
  - *Design Project isn't just one problem, it's an interlinked/interdependent set of problems!*
- **Teamwork is:**
  - Carefully selecting the questions (“*whys, whats, hows*”) that need to be answered in a team member's domain/ area of responsibility
  - Each team member taking responsibility for specific tasks and doing the work—clearly designated roles and responsibilities
  - Discussing and arguing the results in team meetings:
    - *Verify: Are we answering the question right?*
    - *Validate: Are we answering the right question?*
    - If yes, move on to the next set of questions. If no, revisit.

***“Talent wins games, but teamwork and intelligence wins championships.”***  
***-- Michael Jordan***

# Team Dynamics

## *Determines the Outcome of Teamwork*

- All teams develop their own dynamics and personality.
- Each team's key distinguishing characteristics are:
  - ✓ Cultural Norms
    - Are *norms of behavior* based on personal responsibility, accountability, and *mutual trust...or not?*
  - ✓ Working Environment
    - Is the *working environment* characterized by professionalism, and does it encourage collaboration and innovation...or not?
  - ✓ Core Values
    - Are mutual respect, pursuit of excellence, highest levels of ethics and personal integrity included in *core values...or not?*
  - ✓ Open Communication
    - Do the teammates *share* data/ information/ knowledge clearly, openly, and honestly...or not?

# Beware of Team Dysfunction!

## 5 Dysfunctions of a Team

### High Performing Team

#### Results

- Highly motivated / stable team
- Consistently hitting objectives/results
- Focused on team results

#### Accountability

- Poor performance is dealt with
- Team standards the same for all
- People understand / own their work

#### Commitment

- Clear objective and priority
- Buy in from the team
- Fully engaged team members

#### Conflict

- Have healthy team debates
- Work out solutions to issues together
- Challenge poor behavior quickly

#### Trust

- Ask for help
- Share weakness / help each other
- Believe everyone is trying their best



### Dysfunctional Team

#### Results

- High team turnover
- Poor performers
- Focus on own results, not team's

#### Accountability

- Poor performance is tolerated
- Lack of ownership from team
- Objectives missed

#### Commitment

- Discuss same thing over and over
- Won't commit to work
- Unclear objectives and priority

#### Conflict

- Avoid people
- Avoid problems
- Don't confront issues or behaviors

#### Trust

- Hide mistakes
- Make assumptions
- Hold grudges

**TRUST is the Foundation of High Performing Teams**

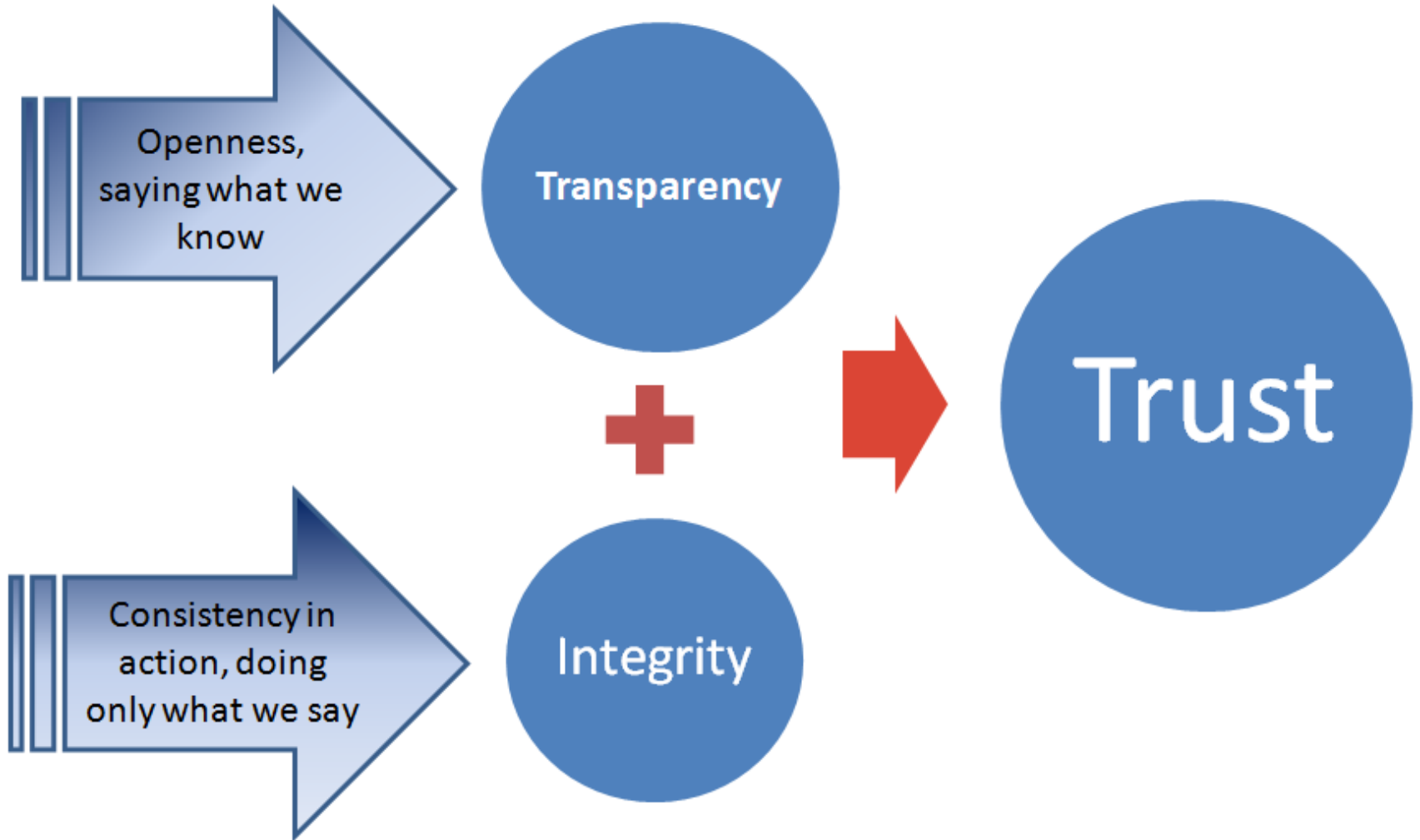


# Teamwork Thrives on Trust

**“WITHOUT TRUST WE DON’T TRULY  
COLLABORATE; WE MERELY  
COORDINATE OR, AT BEST, COOPERATE.  
IT IS TRUST THAT TRANSFORMS A  
GROUP OF PEOPLE INTO A TEAM.”**

**– STEPHEN COVEY**

# Developing Trust: A *Process*



***Promise only what you can deliver.  
Deliver more than what you promise.***

# How to Argue with a Teammate and Remain Friends?

## Argue Well!

“It is incredibly important to remember that in any argument, *it's not you against the other person*. Rather, it's you and the other person against the issue. Separate the human from the problem.”

*Dr. Caroline Leaf*

*Communication Pathologist and Cognitive Neuroscientist*

***Never Forget:  
It's All About the 'What', Not the 'Who'!***

# Teamwork Demands

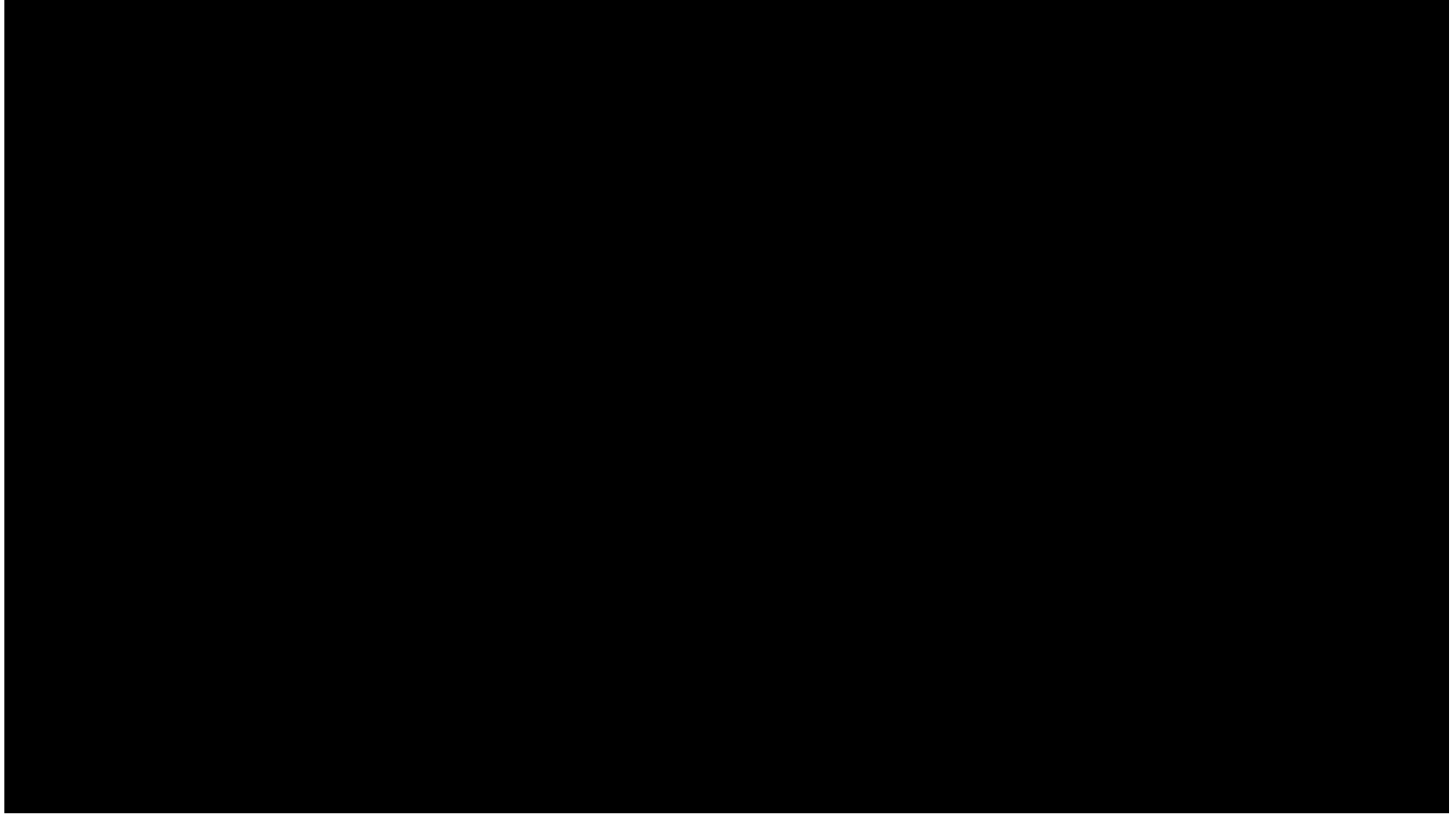
## Each Individual to Add Value

- Be a **strong advocate** for your area
- Be willing to **accept changes to improve total design**
- Be **responsible, accountable, and trustworthy**
  - Meet your objectives
  - Provide data/info when a team member needs it
  - Make sure data/info are accurate and understood by all
  - Use agreed upon processes and protocols for data exchange
  - Focus on effective two-way communication: be proactive

***Be a Professional!***

# *What does it take for high-caliber teams to succeed?*

**Watch this 2 min 26 sec video!**



<https://www.youtube.com/watch?v=f60dheI4ARg>

# How to Go from Good to Best?

- **Communicate frequently**
  - In a typical project team, a dozen or so communication exchanges per working hour may turn out to be optimum; but more or less than that and team performance can decline.
- **Talk and listen in equal measure, equally among members**
  - Lower performing teams have dominant members, teams within teams, and members who talk or listen *but don't do both*.
- **Engage in frequent informal communication**
  - The best teams spend about half their time communicating outside of formal meetings or as "asides" during team meetings, and increasing opportunities for informal communication tends to increase team performance.
- **Explore for ideas and information outside the group**
  - The best teams periodically connect with many different outside sources and bring what they learn back to the team.

***Effective Two-way Communication!***

***“...where minutes are taken and hours are wasted.”***

• IMPLEMENT

Project Management

v  
p  
i  
c

ARE YOU LONELY?  
 HATE WORKING ON YOUR OWN?  
 HATE MAKING DECISIONS?

**HOLD A  
 MEETING!**

YOU CAN:

See People                      Create Flowcharts  
 Impress Your Colleagues      Feel Important  
 ALL ON COMPANY TIME!

**MEETINGS -  
 The Practical Alternative to Work**

© 2007 FranklinCovey



“We need to get more work done and have fewer meetings. Any ideas?”

***Time Wasted Can Never be Regained.***

# How to Hold Effective Team Meetings?

- **Have a Purpose**
  - Focus on the decisions that need to be made as a team
    - *If you are not deciding anything, why are you meeting?*
  - Limit scope; don't try to do too many things in one session
- **No Agenda, No Meeting!**
  - Specific topics with time allocated for each, stick to it!
  - Finalize agenda prior to the meeting
    - *Don't waste time tweaking it in the meeting*
- **Post Key Guidelines (that everyone must adhere to)**
  - As a minimum: (i) No talking over others; (ii) raise your hand and wait until recognized by the team lead; (iii) don't be a "podium hog," limit your part to 5 minutes or less for each topic; (iv) no finger pointing; (v) no whining
  - Everyone should know their roles and responsibilities; post names with R&Rs
- **Record Main Points**
  - Decisions made, action items completed, action items pending with due dates
  - Circulate write-ups prior to the next meeting to make sure everyone is in agreement; revise if necessary
- **Don't Get Tired of Asking WHY (about five times will do!)**

***There is no "I" in TEAM.  
Leave it outside the door.***



# Collaboration:

## *Taking Teamwork to a Higher Level*

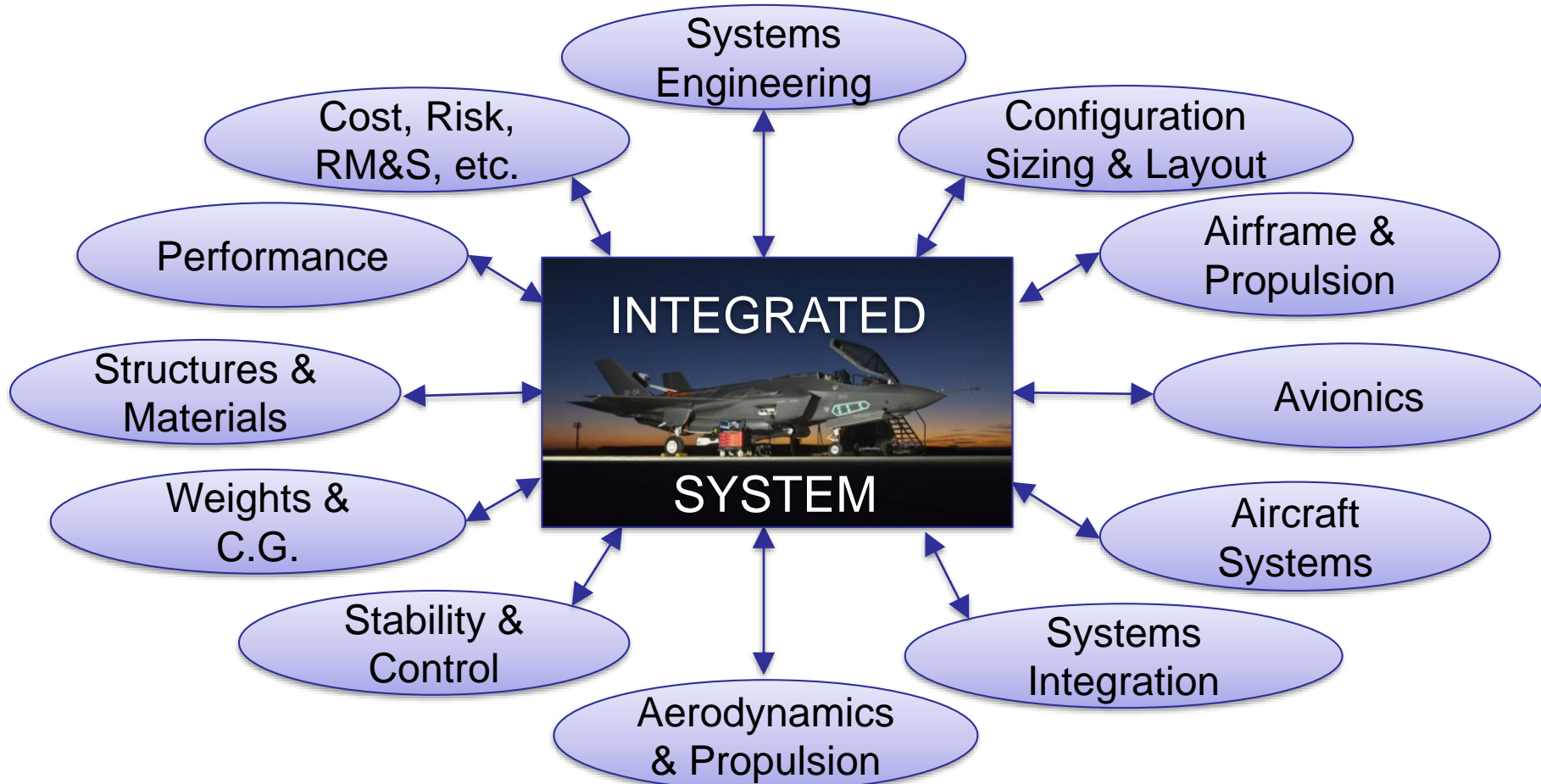
- **Collaboration requires team members to**
  - **Set Aside Egos**
  - **Trust** One Another *Without Reservations*
  - **Willingly Share** Common Vision and Expertise/ Experiences
  - **Communicate** Effectively
  - **Network** Across Disciplinary Boundaries
  - **Learn Teamwork**
- **The Whole is Greater than the Sum of Individual Parts**

***Recipe for Spectacular Results!***



# *Epilogue*

# A Typical Air Vehicle Design Project



Disciplinary teams are tasked to provide “expert advice” and data—on time and on budget—to configuration designer who integrates it all into an innovative configuration.

***Dedicated Effort by All Team Members is Essential to Success!***



## INDIFFERENCE

IT TAKES 43 MUSCLES TO FROWN AND 17 TO SMILE,  
BUT IT DOESN'T TAKE ANY TO JUST SIT THERE WITH A DUMB LOOK ON YOUR FACE.

***...IF You Want to Make a Difference!***

# When You Do Run into a Problem...

## Flowchart For Problem Resolution

