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CREW COORDINATION CONCEPTS:
CONTINENTAL AIRLINES CRM TRAINING

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INTRODUCTION

This workshop emphasizes the importance of crew coordination as part of the overall resource management function. The need for such training has received increasing emphasis because of studies conducted by NASA that indicate a link between resource management and safety. John Lauber summarizes the findings of those studies in his paper presented at a NASA/Industry workshop in 1979 and states that: "One of the principal causes of incidents and accidents in civil jet transport operations is the lack of effective management of available resources by the flight-deck crew."

A pilot interview study by NASA indicated an expressed level of satisfaction with technical training, but difficulties with issues such as leadership, crew coordination, and communication within the cockpit.

The NASA studies also included research of the Aviation Safety Reporting System (ASRS) that found problems in resource management in the following areas:

1) Social and communication skills

2) Leadership and management skills

3) Planning, problem solving, and decision-making

4) Role

5) Resources (human and material)

Another significant contribution to the research on human resource management on the flight deck is from Robert L. Helmreich of the University of Texas. His comments stem from many years of research dealing with situational and personality determinants of crew performance. He indicates that "...perhaps our most serious failing in our approach to complex problems of crew performance comes from ignoring the fact that behavior is a function of the *interaction* of the personality and situational factors."

A third source of information comes from Lee Bolman of Harvard University in his research on "Aviation Accidents and the Theory of the Situation." His research provides the basis for the approach we are taking in presenting a model for examining

interpersonal skills and human interaction as a vital element in overall safety and effectiveness in the cockpit.

The Crew Coordination Concepts Workshop is designed to address his recommendations that: "Pilots need to understand the interaction between situations and their own theories of practice. They need to appreciate the distinction between *espoused theory* and *theory-in-use* and be able to explore the possibilities of discrepancies in their own theories. They need to understand the importance of skill in inquiry and on-line learning, and they need to learn theories of piloting that emphasize those skills. They need a conceptual understanding of the interpersonal processes and role issues that are critical to the flight deck situation and they need practice and skill in implementing those concepts." As Bolman suggests, we:

1) Present relevant theory: Contained in a pre-work package and in lecture/discussion form during the work course.

2) Discuss case examples: Contained in the pre-work for study and use during the course.

3) Simulate practice problems: Introduced during the course as the beginning of an ongoing process.
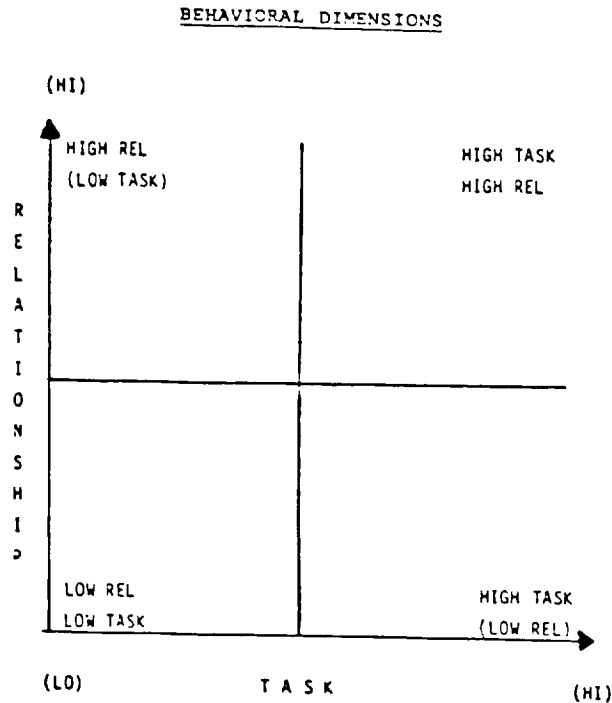
OVERVIEW OF RELEVANT MANAGEMENT THEORY

There are many theories about leadership style that have served as points of reference in developing the model that is presented here and discussed in detail in the two-day course. Among the most prominent theories is Douglas McGregor's model of leadership developed in 1960 that has resulted in a standard reference to "Theory X" and "Theory Y" management. According to McGregor, management styles range from *Autocratic* (Theory X) to *Democratic* (Theory Y). A Theory X leader would be directive, structuring, critical, and autocratic, while a Theory Y leader would stress democratic procedures, participative decision-making and self-control.

In 1983 Bill Ouchi introduced his Theory Z, which indicates that managers need to combine characteristics of both styles if they are to be successful in current times. In 1964 Robert Blake and Jane Mouton introduced The Managerial Grid, describing five basic styles, as a way of understanding differences in leadership behavior. In 1969 Paul Hersey and Kenneth Blanchard developed the Situational Leadership model that suggests leaders adopt a style that matches the maturity level of the follower. Works by Peter Drucker and Daniel Yankelovich indicate work-place trends that emphasize the need to be concerned with a better educated and more diverse workforce.

Most of these theories place emphasis and responsibility for success on the manager or leader. Although many different labels are used, all of these theories have one thing in common, i.e., they all present behavioral options on the two basic dimensions of *task* and *relationship,* depicted in the following illustration.

BEHAVIORAL DIMENSIONS

(HI)

```
              HIGH REL                    HIGH TASK
              (LOW TASK)                  HIGH REL
    R
    E
    L
    A
    T
    I
    O
    N
    S
    H
    I
    P
              LOW REL                     HIGH TASK
              LOW TASK                    (LOW REL)

    (LO)                   T A S K                    (HI)
```

TASK AND RELATIONSHIP MODEL FOR THE FLIGHT DECK

All airlines regularly conduct recurrent technical training which is designed to develop and enhance piloting skills and systems knowledge. Most airlines set very high standards in the area of the technical aspects of being a pilot. The pilots hired must already be skilled before they are even considered. Once hired, a new pilot is provided technical training which focuses on raising both piloting skills and systems knowledge to the maximum. That skill and knowledge must then be demonstrated before the pilot goes out on the line.
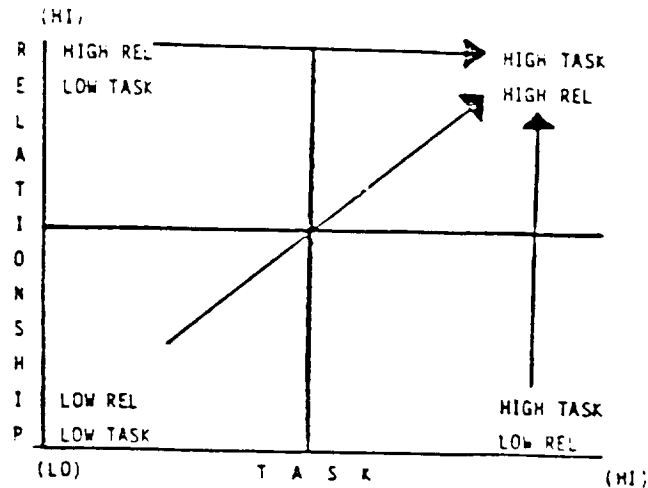
As noted in the NASA research, and supported by more recent studies, most flight crew members are competent in the technical dimension, but need a better understanding of their interpersonal relationships.

Because optimum performance on the flight deck depends on cooperation among crew members, we need to pay equal attention to developing interpersonal communication skills to match the technical skill level required. This area becomes more complex because human factors, such as differences in personal style, are harder to define than a concrete set of technical skills.

However, if we look once again at the basic *task* and *relationship* model, we can
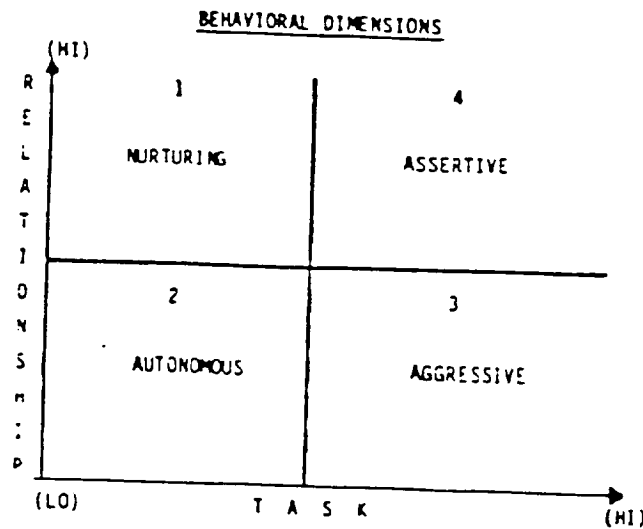
70

appreciate the desirability of functioning at the peak of both high relationship-behavior and high task-behavior.

BEHAVIORAL DIMENSIONS

```
(HI)
R │ HIGH REL ─────────────────────────────▶  HIGH TASK
E │ LOW TASK                        ◥        HIGH REL
L │                               ╱
A │                             ╱
T │                           ╱
I │─────────────────────────╱──────────────│──────
O │                       ╱                 │
N │                     ╱                   │
S │                   ╱                     ▲
H │                 ╱                       │
I │ LOW REL                        HIGH TASK│
P │ LOW TASK                         LOW REL│
  └─────────────────────────────────────────────
  (LO)              T  A  S  K              (HI)
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In order to be an effective crew member, each person needs to understand his/her own basic behavioral style *and* the behaviors that are required to perform effectively. While no one behavior is inherently better than another, there is definitely desired behavior in the cockpit.

We can begin the process of identifying four basic behaviors by looking again at the *task* and *relationship* model and applying labels to the four quadrants:

BEHAVIORAL DIMENSIONS

```
(HI)
R │         1                    │        4
E │                              │
L │     NURTURING                │    ASSERTIVE
A │                              │
T │                              │
I │──────────────────────────────│─────────────
O │         2                    │        3
N │                              │
S │     AUTONOMOUS               │   AGGRESSIVE
H │                              │
: │                              │
P └──────────────────────────────────────────▶
  (LO)          T  A  S  K              (HI)
```

o Quadrant 1 indicates a high level of relationship-behavior and a low level of

71

task-behavior, labeled *Nurturing*.

o Quadrant 2 indicates a low level of both relationship- and task-behavior, labeled *Autonomous*.

o Quadrant 3 indicates a high level of task-behavior and low level of relationship-behavior, labeled *Aggressive*.

o Quadrant 4 indicates a high level of both relationship- and task-behavior, labeled *Assertive*.

Our contention is that assertive behavior is always the desirable behavior in the cockpit. Assertive behavior indicates highly-developed skills in both task and relationship and is most likely to produce an assertive response from other crew members and ensure the open exchange of information.

As noted above, the review of ASRS reports indicated a need for pilot development in five key areas:

o Communication

o Leadership

o Role

o Decision-Making

o Resources

Communication

We use Bolman's terminology to present and develop communication skills. *Advocacy* and *inquiry* are ways to bring information to the surface when it is needed and are essential to effective flight deck management. All crew members have an obligation to raise issues that affect the safe operations of the aircraft and an equal obligation to be open to the input of other crew members. Developing these skills typically requires changes in one's *theory of practice*. The ability to confront and manage any conflict that might arise from that confrontation develops skill in *advocacy*. The skill of *inquiry* is developed by seeking information from other crew members that would test the assumptions made by self and others. The ideal situation in the cockpit would be where each crew member volunteers information and *advocates* a course of action, and where each remains open to further *inquiry*.

Each person's individual style and theory of practice need to be consciously understood so that conscious choices can be made to effect the desired change in behavior or theory in use. The desired behavior on the flight deck would be to have available the skills to operate at a high level of both *advocacy* and *inquiry*, as required by the situation.

In the workshop, we use a personal styles instrument, the Strength Deployment Inventory (SDI), to help each person understand how they relate to and communicate with others. This instrument explores how relations with self and others can be made more productive and satisfying.

Leadership and Roles

These two topics are combined because of the need to establish role clarity and role flexibility to ensure that each member of the crew is performing effectively.

In an emergency, captains sometimes try to do too much by themselves and to overcontrol crew members. Leadership on the flight deck requires well-developed skills in both task and relationship. As Bolman suggests: "What is needed is a system that preserves the captain's authority to make binding decisions, but places a positive responsibility on other crew members to raise questions or suggest alternatives when they perceive that the captain's strategy might lead to significant error."

Thus leadership behavior is best determined by the situation. In times of emergency, this calls for the ability to surface information quickly and consistently in order to make effective decisions.

Decision-Making

Traditionally, the responsibility for making decisions rests almost entirely on the shoulders of the captain. That responsibility consists of not only making the proper decision, but also of possessing all of the knowledge necessary to make the proper decision. The captain on today's flight deck *still* has that ultimate decision-making responsibility. That has not changed. What has changed is that the other crew members on the flight deck are being asked to accept more responsibility in helping and assisting that decision-making process by communicating the knowledge they possess regarding a particular situation. Obviously, the more knowledgeable input there is into making a decision, the better the odds are that the right decision will be made.

Resources

The importance of using all resources has been repeatedly stressed in reviewing aviation accidents that could have been prevented *if* the crew had made optimal use of available resources. An example is the worst accident in history, the collision of two B-747s at Tenerife. In that accident, the KLM captain began his take-off roll despite his copilot's suggestion that the runway might not be clear. This course examines the elements of desired cockpit behavior that could prevent this kind of example.

Summary

Improvement of resource management is the purpose of this workshop. Review of accidents and NASA studies indicate the following common factors as the most frequently observed problems:

o Preoccupation with minor mechanical problems

o Inadequate leadership

o Failure to delegate tasks and assign responsibilities

o Failure to set priorities

o Inadequate monitoring

o Failure to utilize available data

o Failure to communicate intent and plans

These findings support the need to emphasize the human resource management aspect of flight deck management. A commitment to safety includes a system that ensures the technical capacity to respond to all situations in the cockpit. In this course we emphasize the equal importance of understanding human resource management by presenting the concepts of Assertiveness, Theory of the Situation, Testing Assumptions, Active Listening, Norms, and Critique that will help aviators build these relationship skills.