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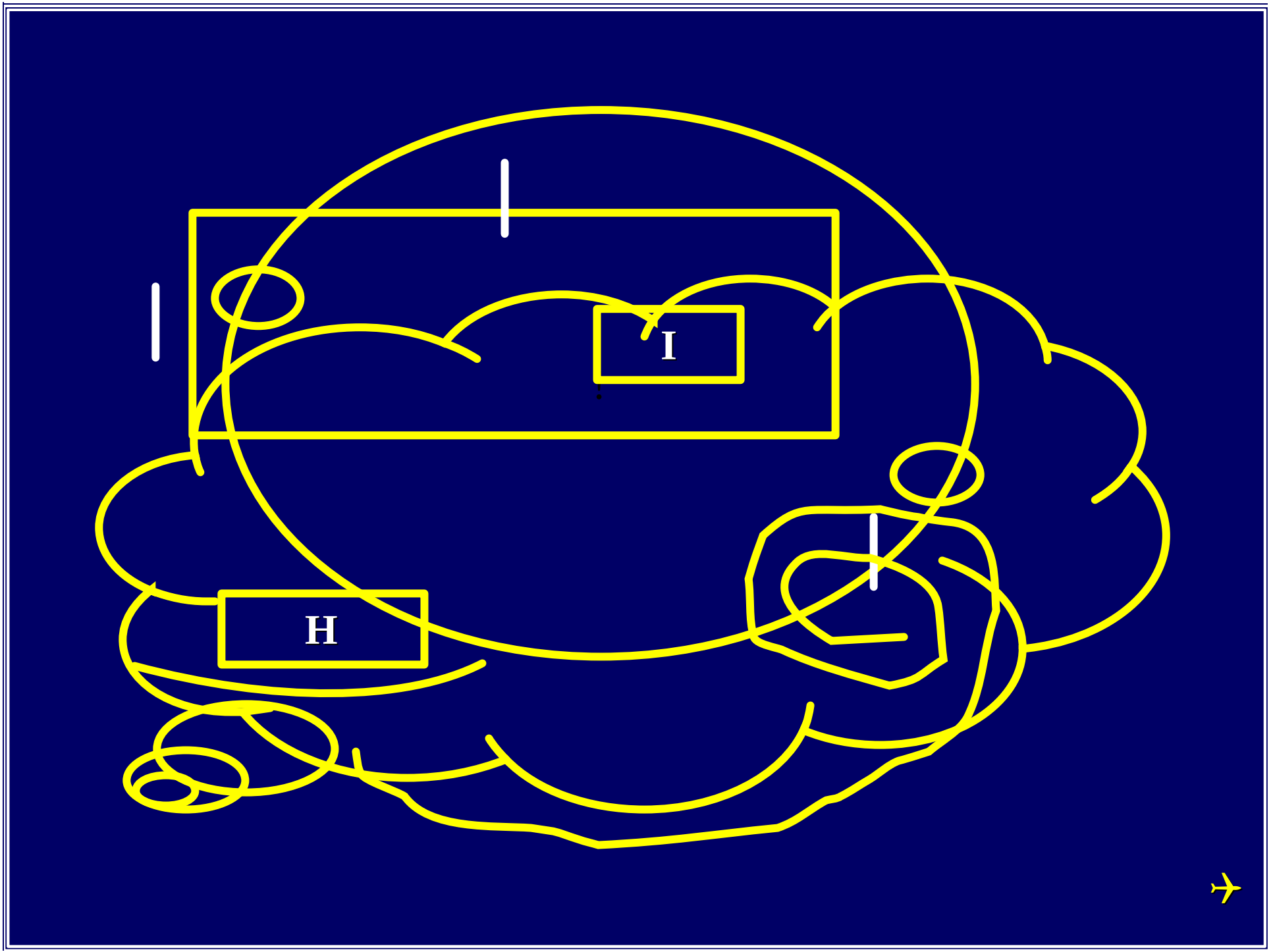
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ICAO SEMINAR ON PAVEMENT MANAGEMENT SYSTEMS (SGP) AND SHORT COURSE ON THE PCI METHOD

# "OVERVIEW ON PMS BASIC CONCEPTS"

*Dr. S.H. Cardoso, Ph.D.*
*AGA Regional Officer – ICAO/LIMA*

*Lima, Peru, 19 November 2003*

# “OVERVIEW ON PMS BASIC CONCEPTS”

INTRODUCTION

BRIEF BACKGROUND

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PMS SUBSYSTEMS

WHY SYSTEMS?

# “OVERVIEW ON PMS BASIC CONCEPTS”

PMS LEVELS

DATA COLLECTION

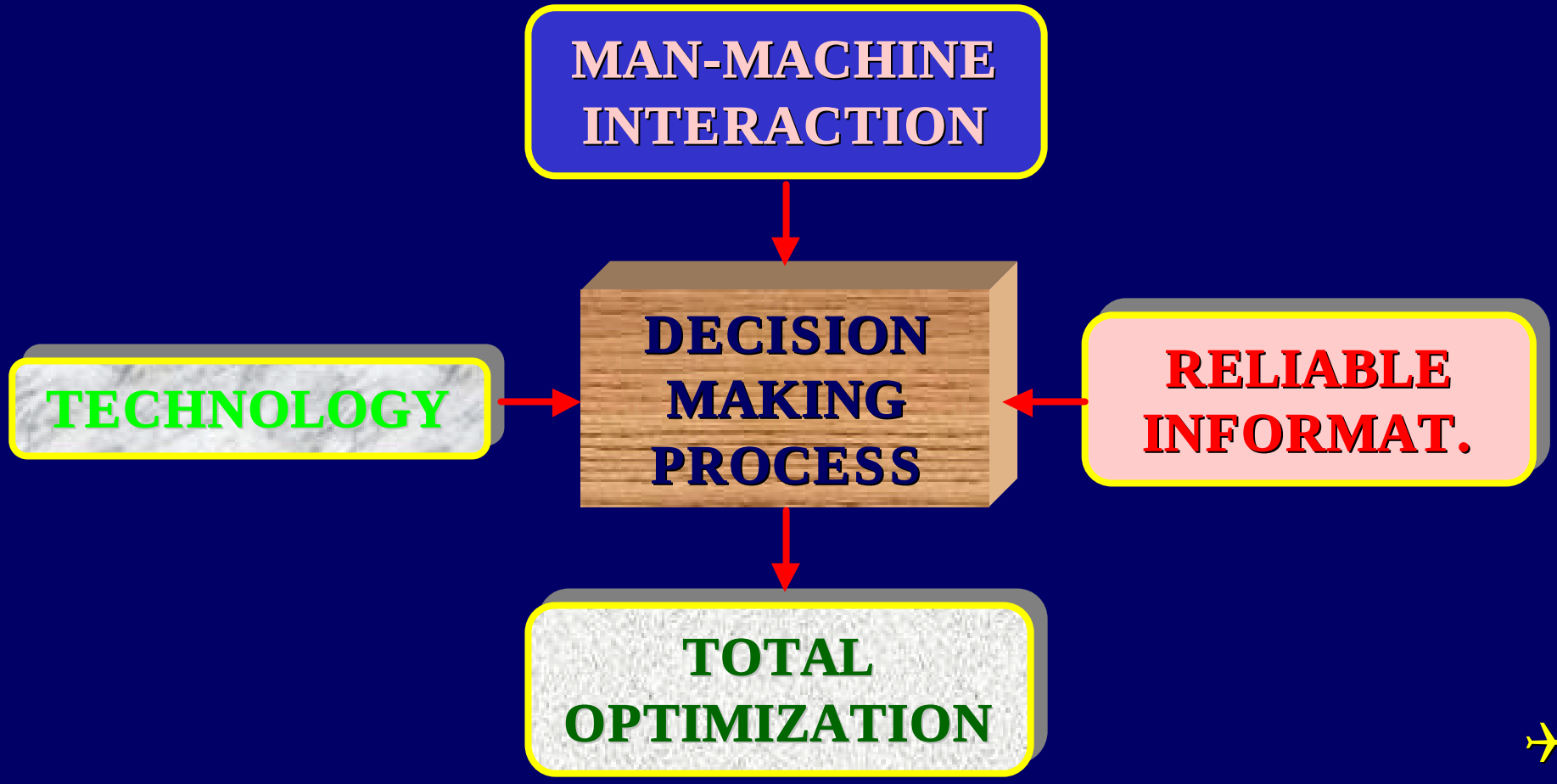
HOW DOES A PMS WORK?

SHOULD A PMS BE SOPHISTICATED?

CONCLUSIONS

# “OVERVIEW ON PMS BASIC CONCEPTS”

## INTRODUCTION



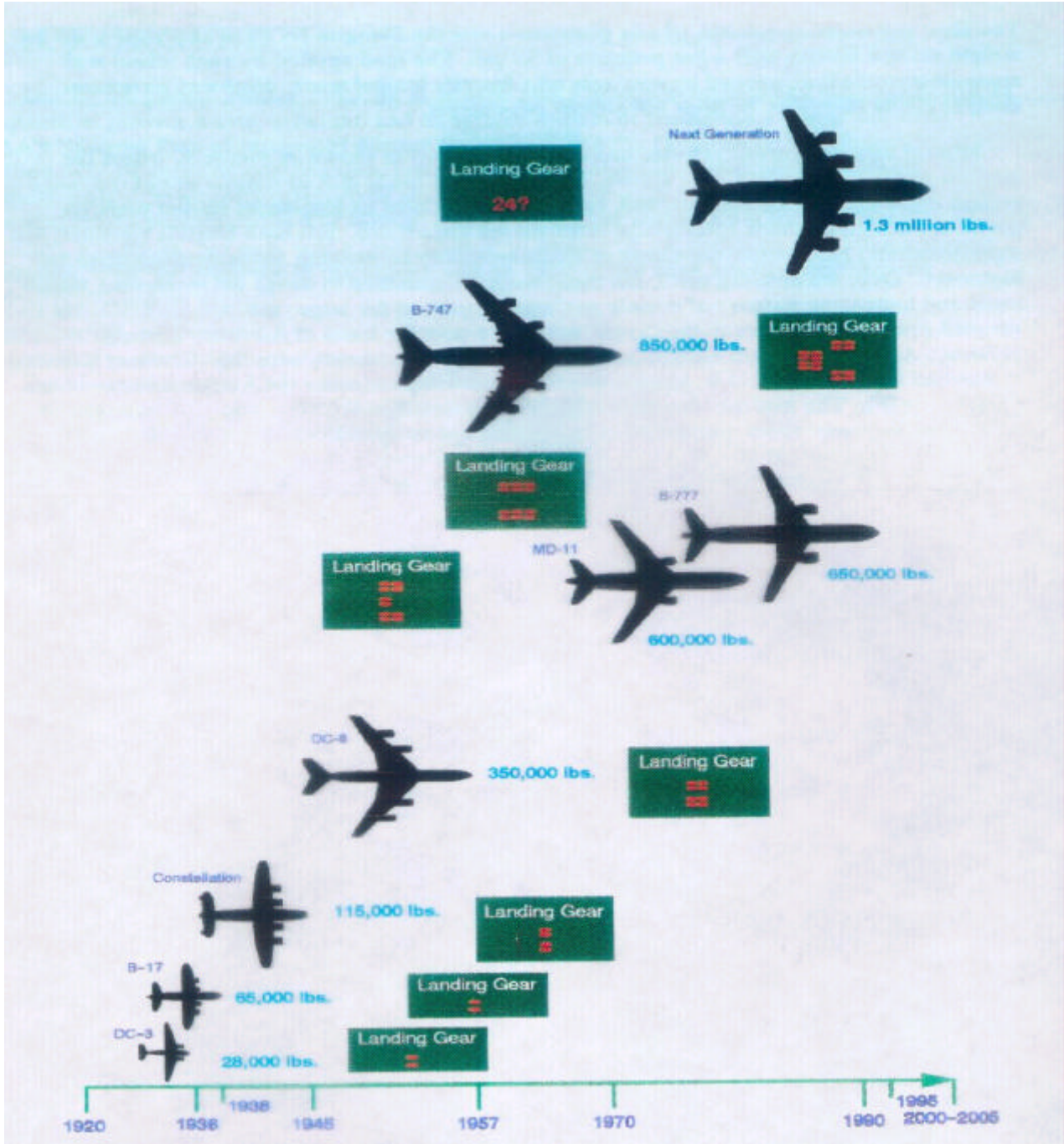
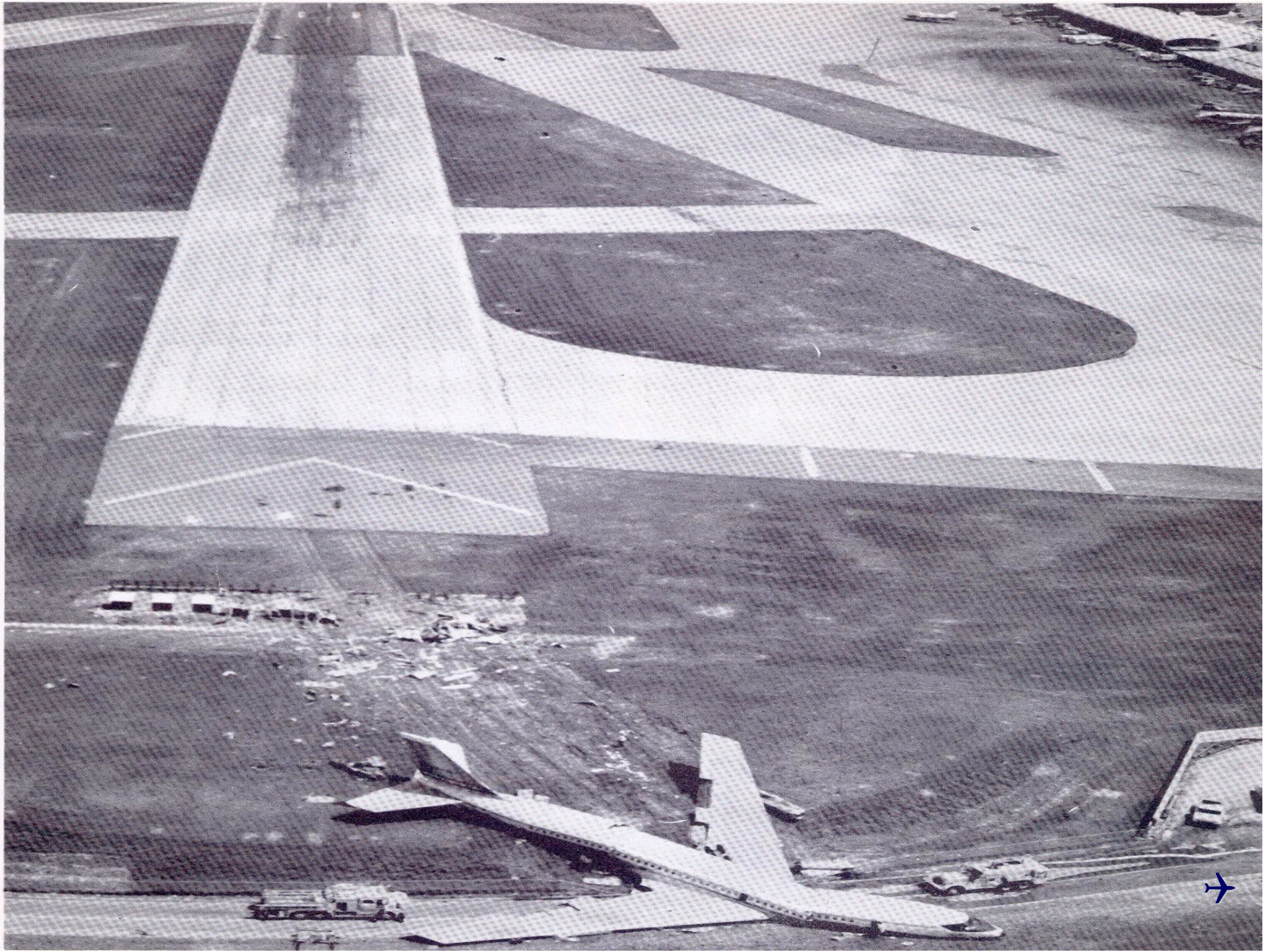



*Figure 3. Evolution of Aircraft by Weight and by Number of Wheels*

| | Boeing B-747-400 IGW | Boeing B-747-400 IGW (Stretch) |
|---|---|---|
| Max. take-off weight (t) | 417 | 417 (min.) |
| Wing span (m) | 65.0 | 65.0 |
| Overall length (m) | 71.0 | 78.0 |
| Passengers (tri-class) | 416 | 485 |

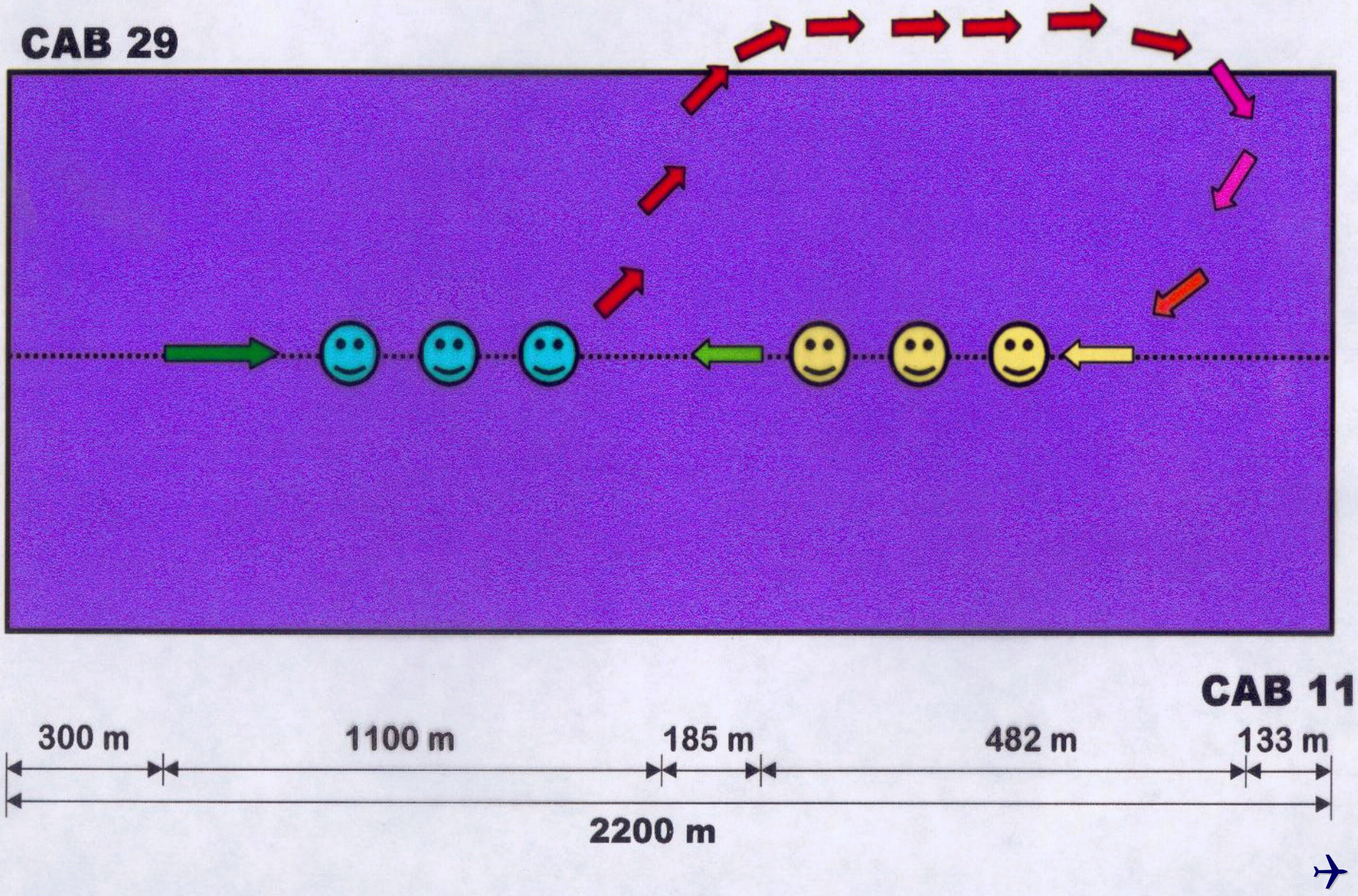


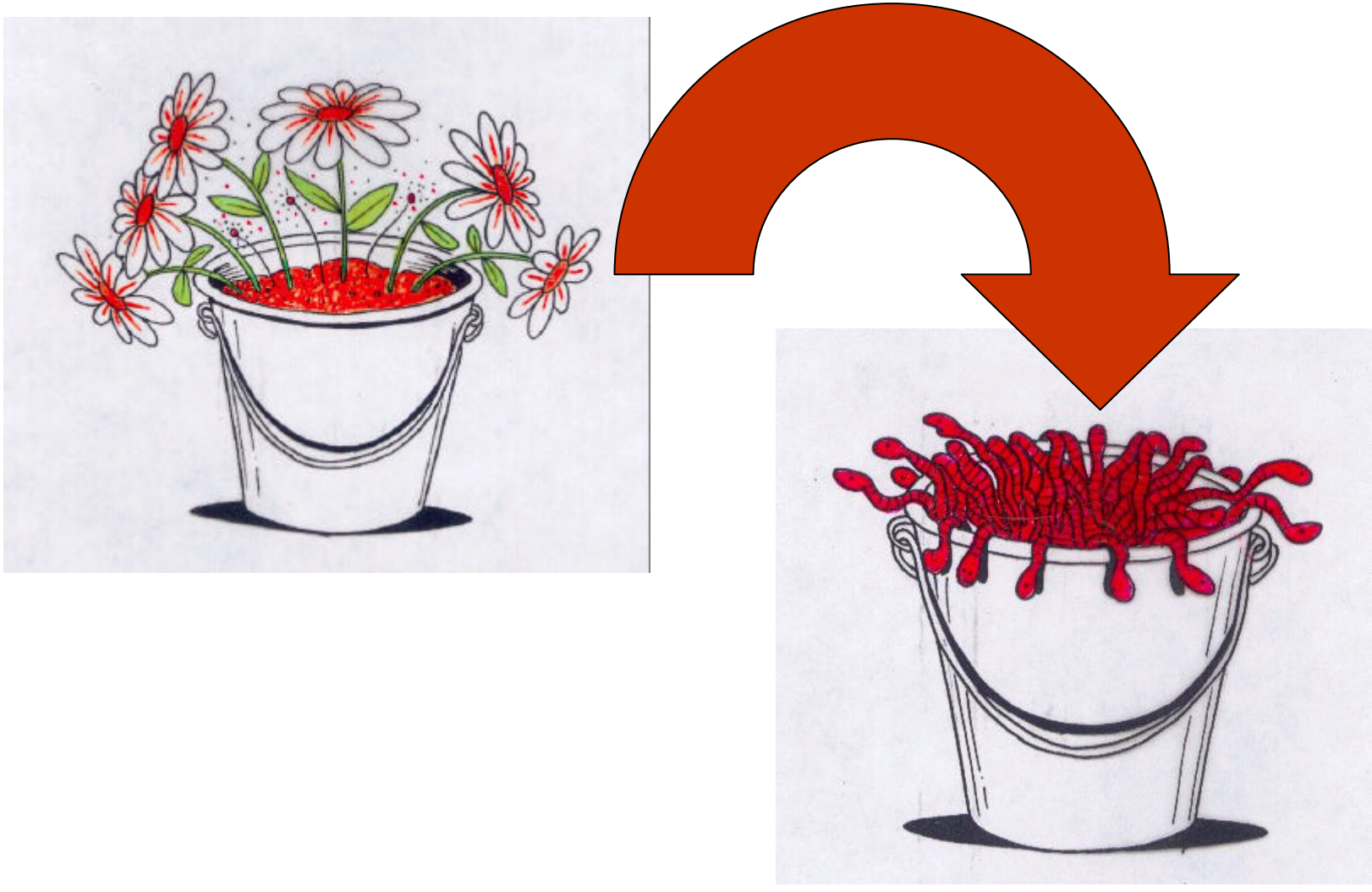
| | A3XX-100 | A3XX-200 |
|---|---|---|
| Max. take-off weight (t) | 540 | 583 |
| Wing span (m) | 79.0 | 79.0 |
| Overall length (m) | 70.8 | 77.4 |
| Tail height (m) | 24.3 | 24.3 |
| Passengers (tri-class) | 555 | 555 to 650 |
| Range (km) | 14 200 | 14 200 |



# CONSECUENCIA DE PISTA RESBALADIZA

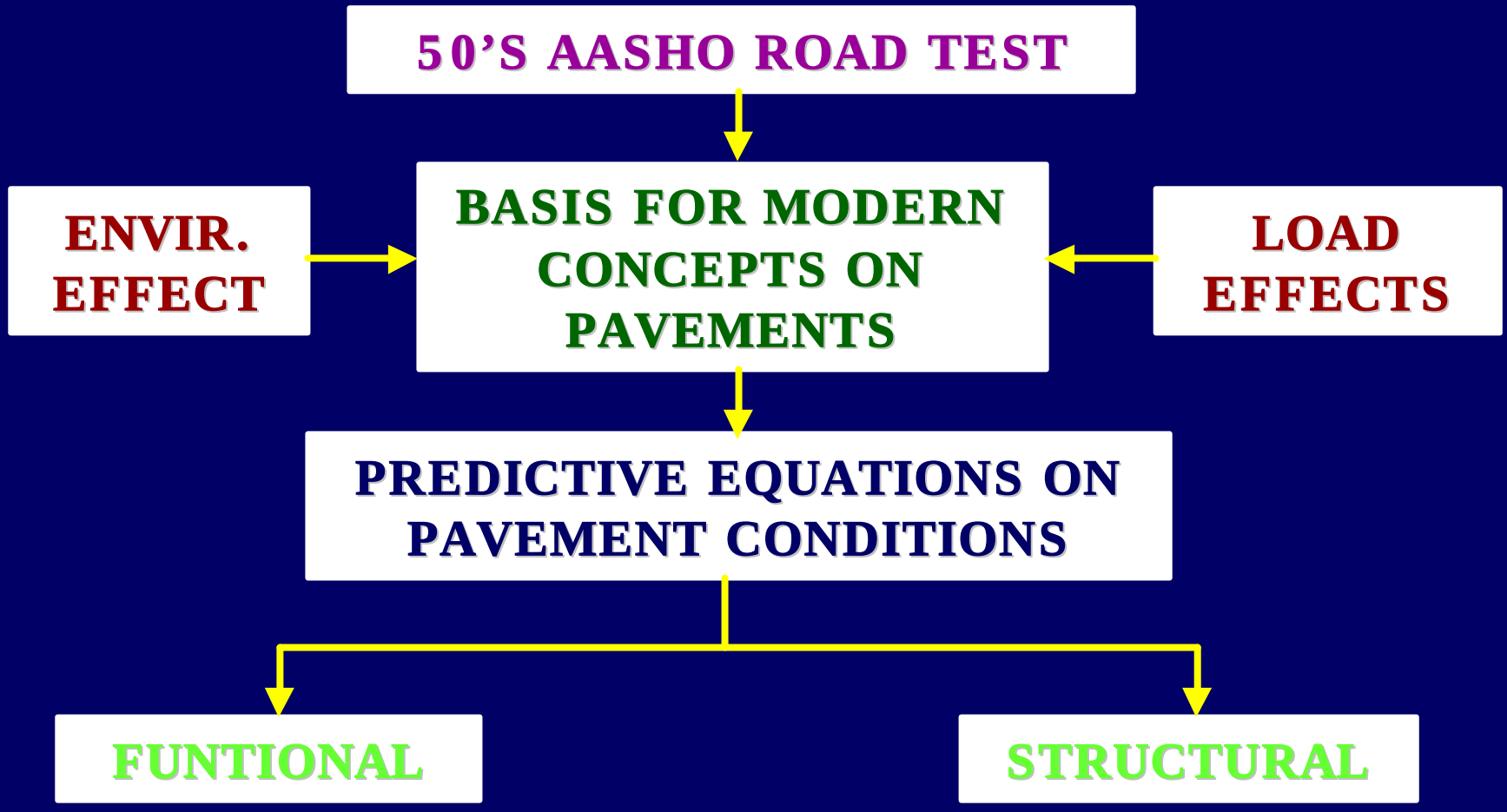

30/04/2000 Entebbe, Lago Victoria, Uganda

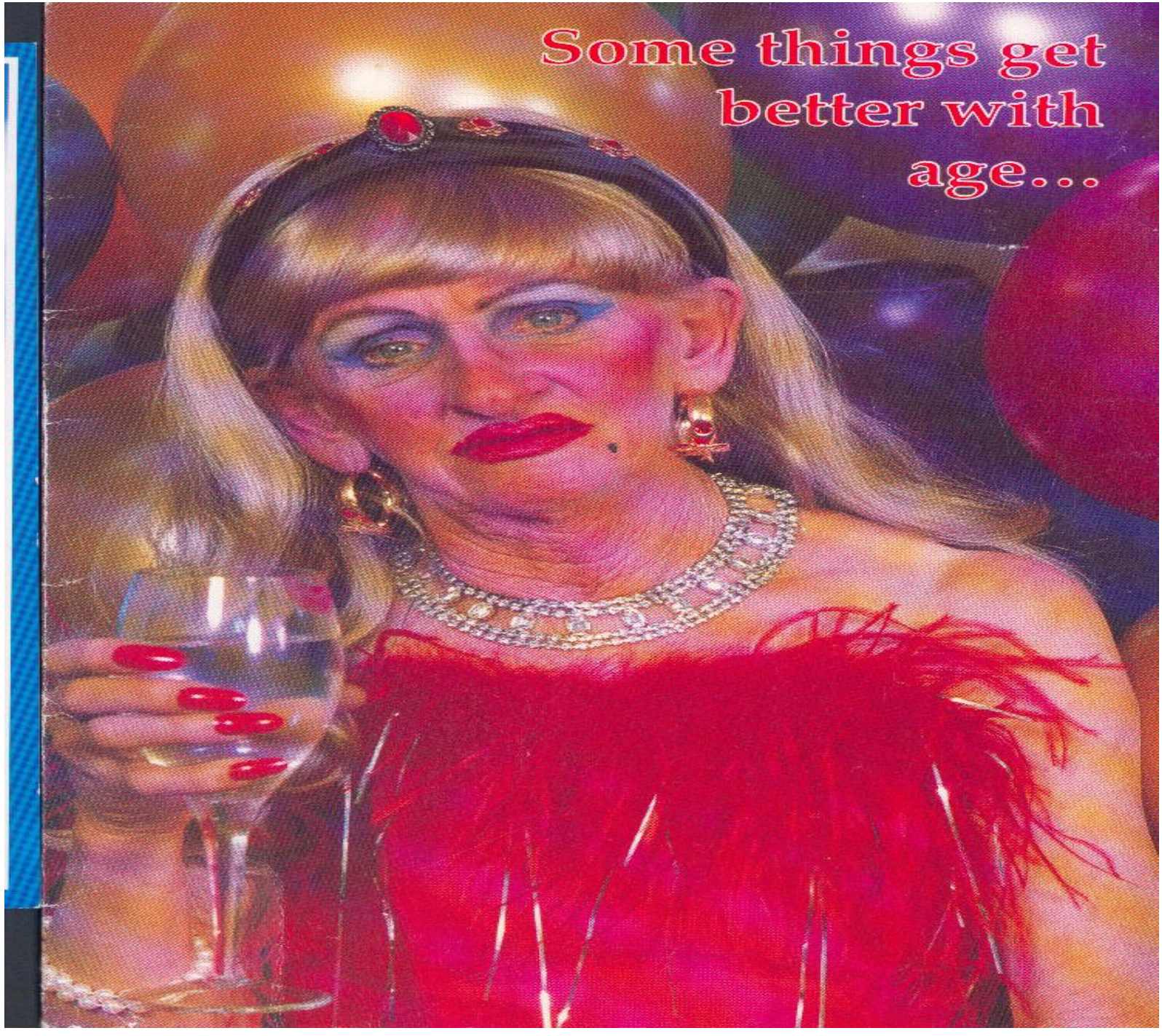

CAB 29
CAB 11
300 m
1100 m
185 m
482 m
133 m
2200 m



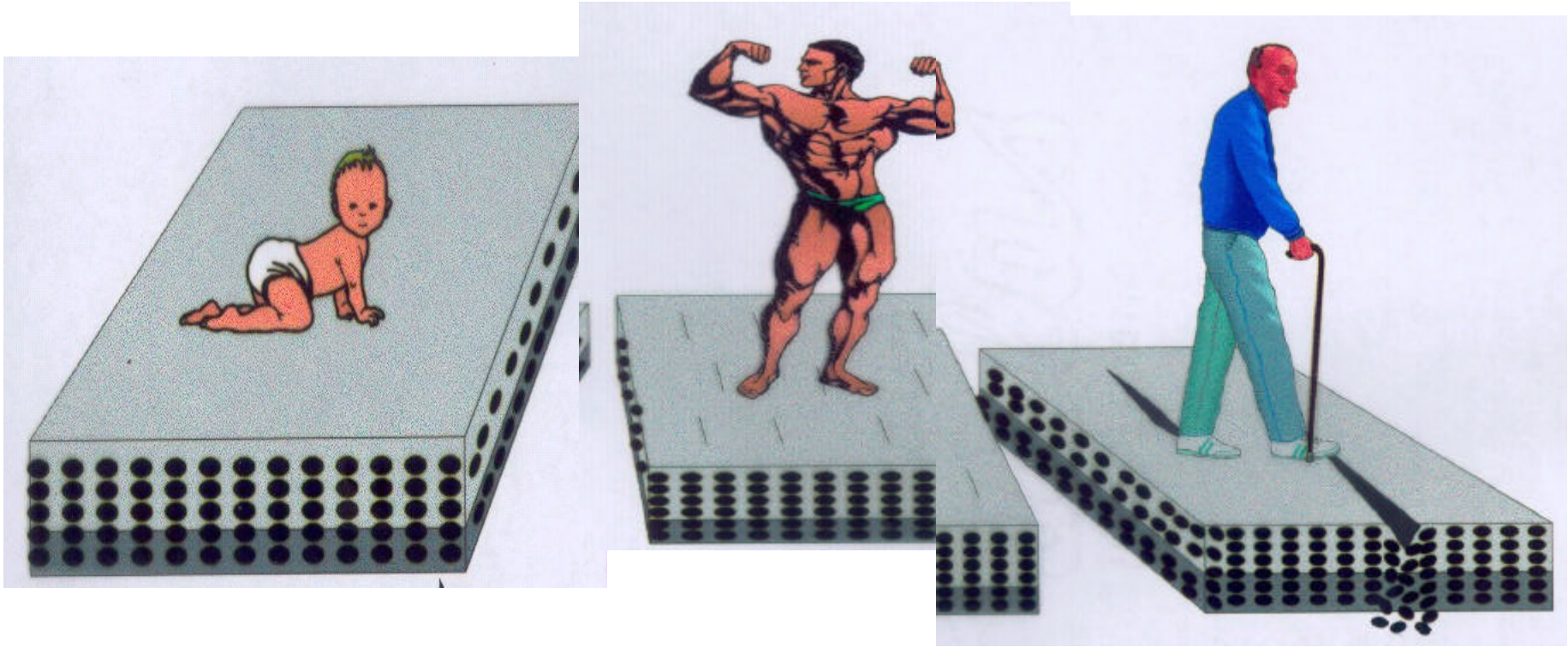
# "OVERVIEW ON PMS BASIC CONCEPTS"

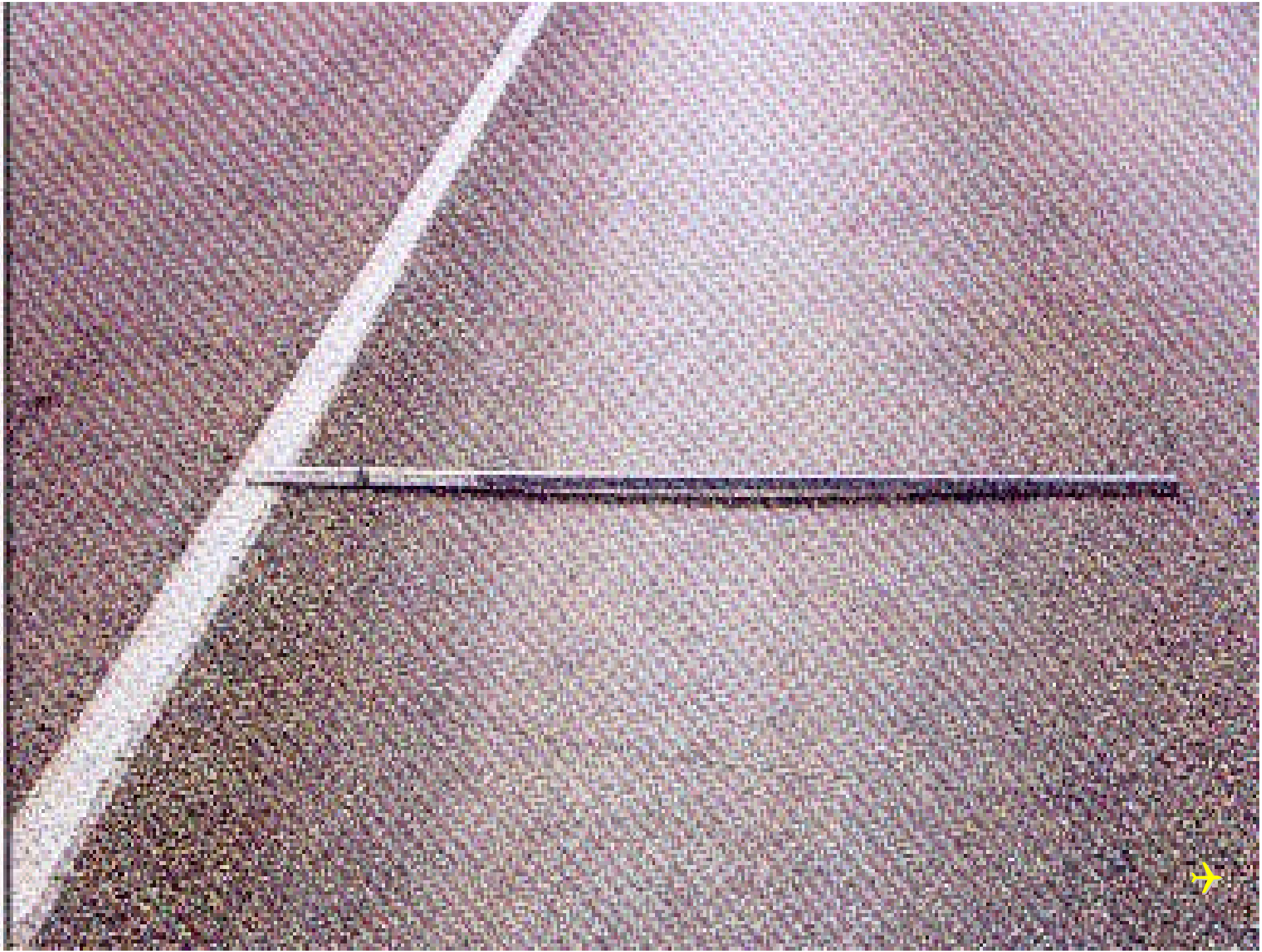
## BRIEF BACKGROUND




Some things get
better with
age...

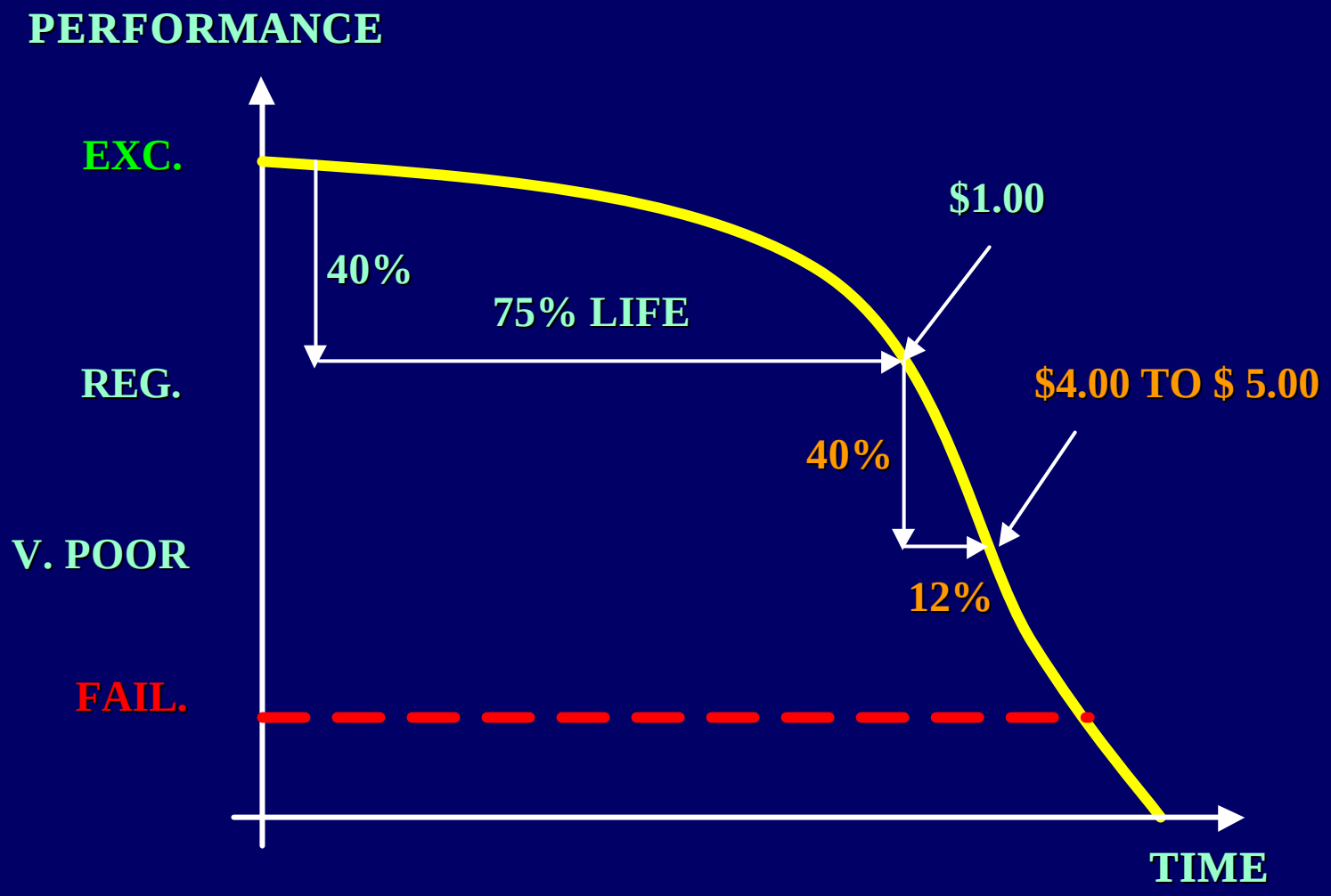
# BRIEF BACKGROUND





# “OVERVIEW ON PMS BASIC CONCEPTS”

## BRIEF BACKGROUND



# “OVERVIEW ON PMS BASIC CONCEPTS”

## WHAT ARE PMS?

COORDINATION & CONTROL PROCESS

OF A SET OF ACTIVITIES

THAT PERMIT OPTIMIZE PAVEMENT MAINTENANCE

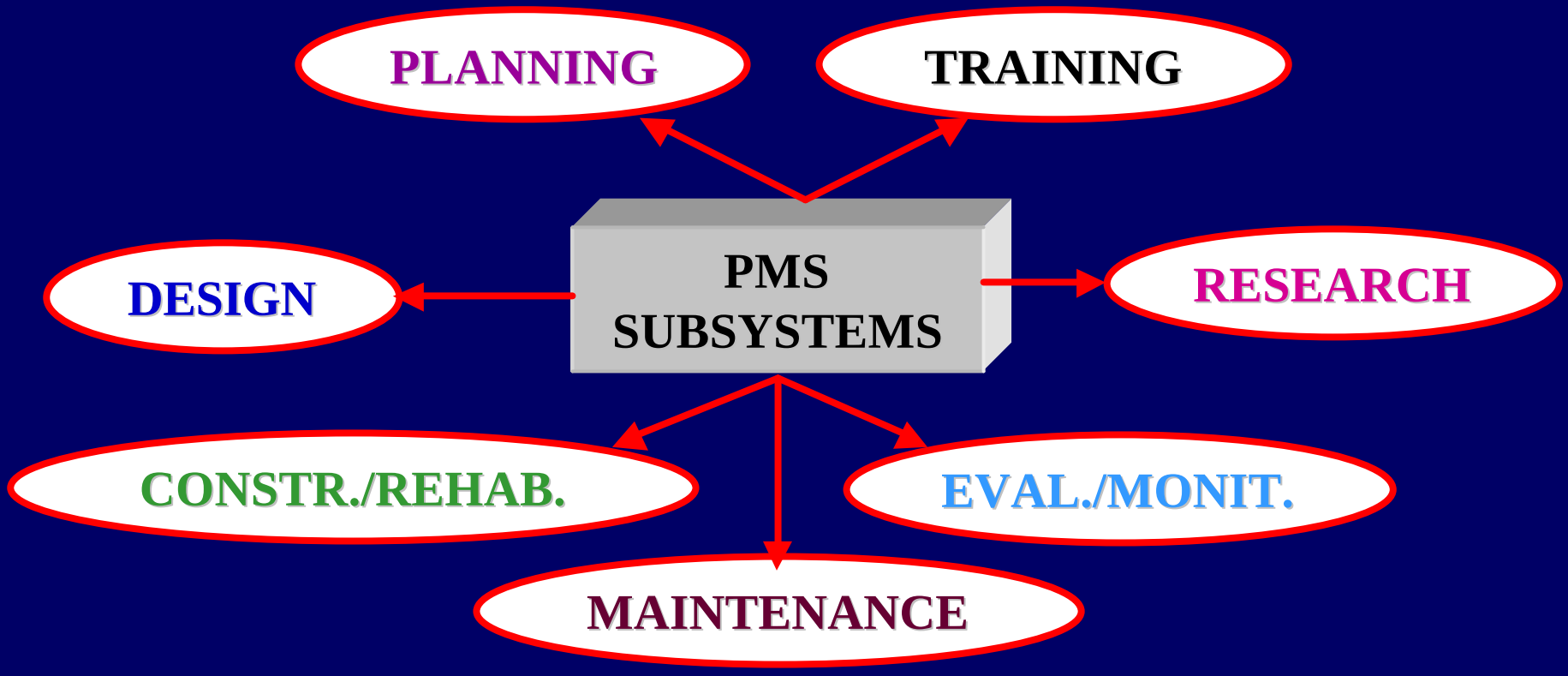
USING AVAILABLE RESOURCES

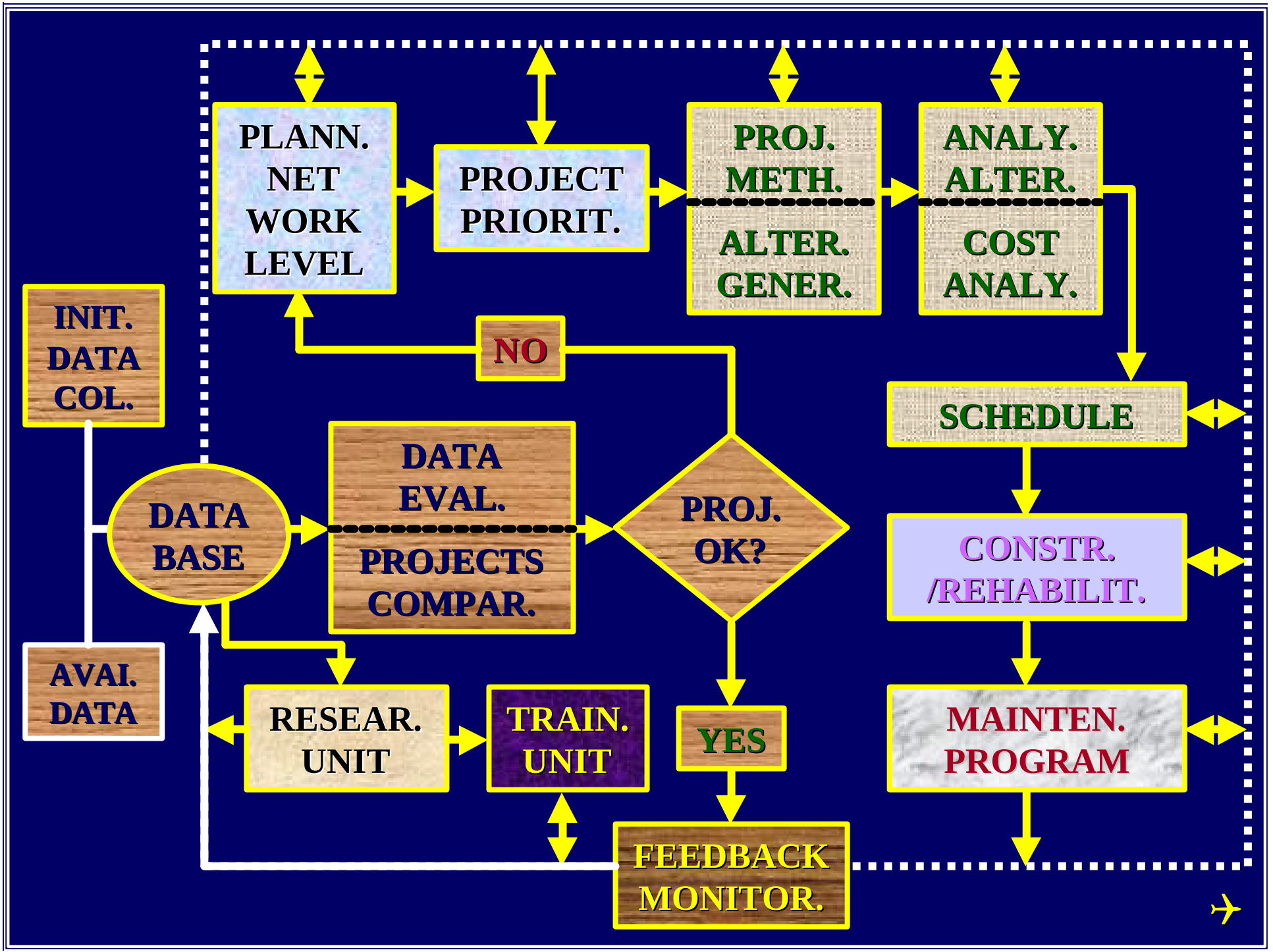
IN THE BEST WAY

LOOKING FOR THE MAXIMIZATION FO THE BENEFITS FOR THE SOCIETY

# "OVERVIEW ON PMS BASIC CONCEPTS"

## PMS SUBSYSTEMS




PLANN.
NET
WORK
LEVEL
PROJECT
PRIORIT.
PROJ.
METH.
ALTER.
GENER.
ANALY.
ALTER.
COST
ANALY.
INIT.
DATA
COL.
NO
SCHEDULE
DATA
BASE
DATA
EVAL.
PROJECTS
COMPAR.
PROJ.
OK?
CONSTR.
/REHABILIT.
AVAI.
DATA
RESEAR.
UNIT
TRAIN.
UNIT
YES
MAINTEN.
PROGRAM
FEEDBACK
MONITOR.

# "OVERVIEW ON PMS BASIC CONCEPTS"

## WHY SYSTEMS?

**WHAT IS THE OBJECTIVE OF A PMS?**

↓

**PLANNING, PRIORITY AND RATIONALIZATION OF PUBLIC APPLICATION OF INVESTMENTS IN PAVEMENTS**

↓

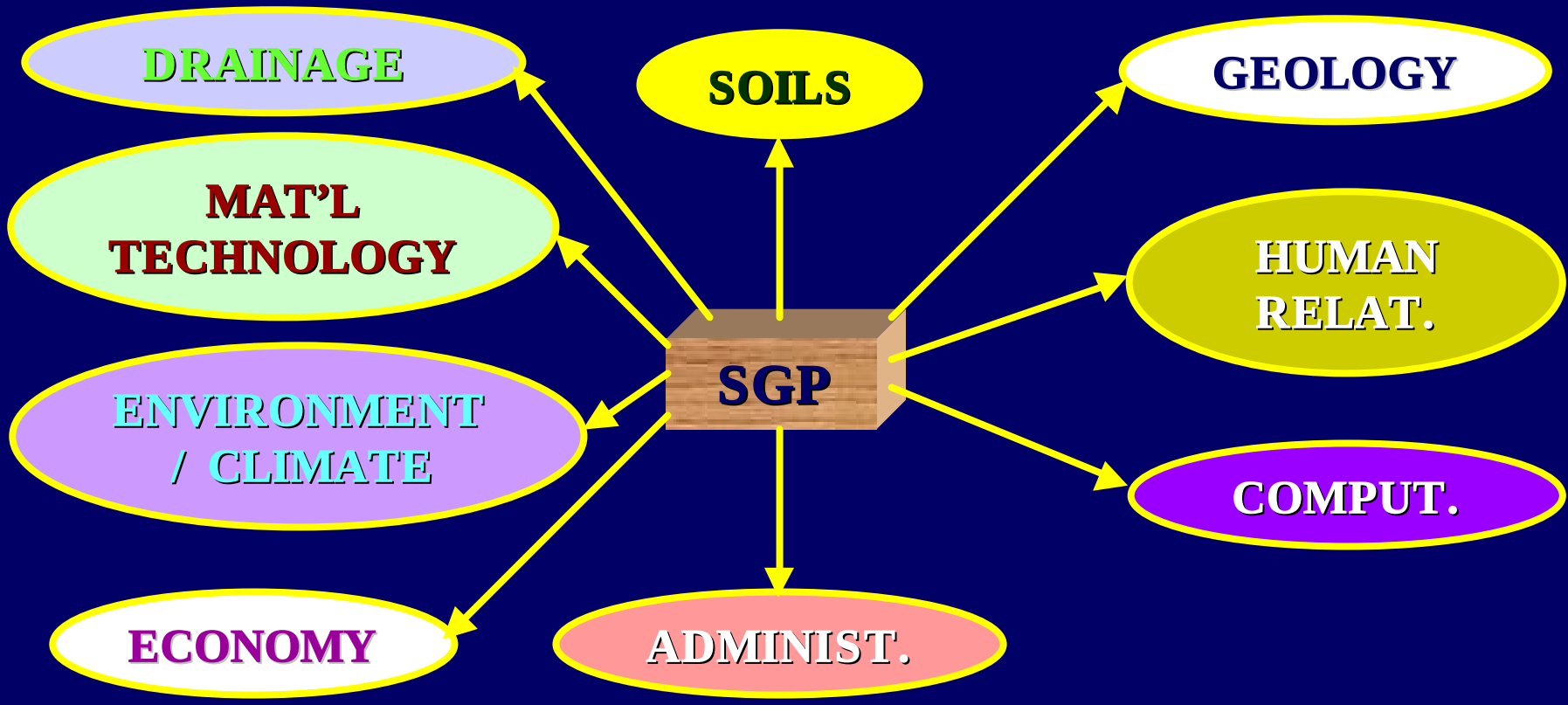
**IMPROVEMENT OF THE DECISION MAKING PROCESS**

↓

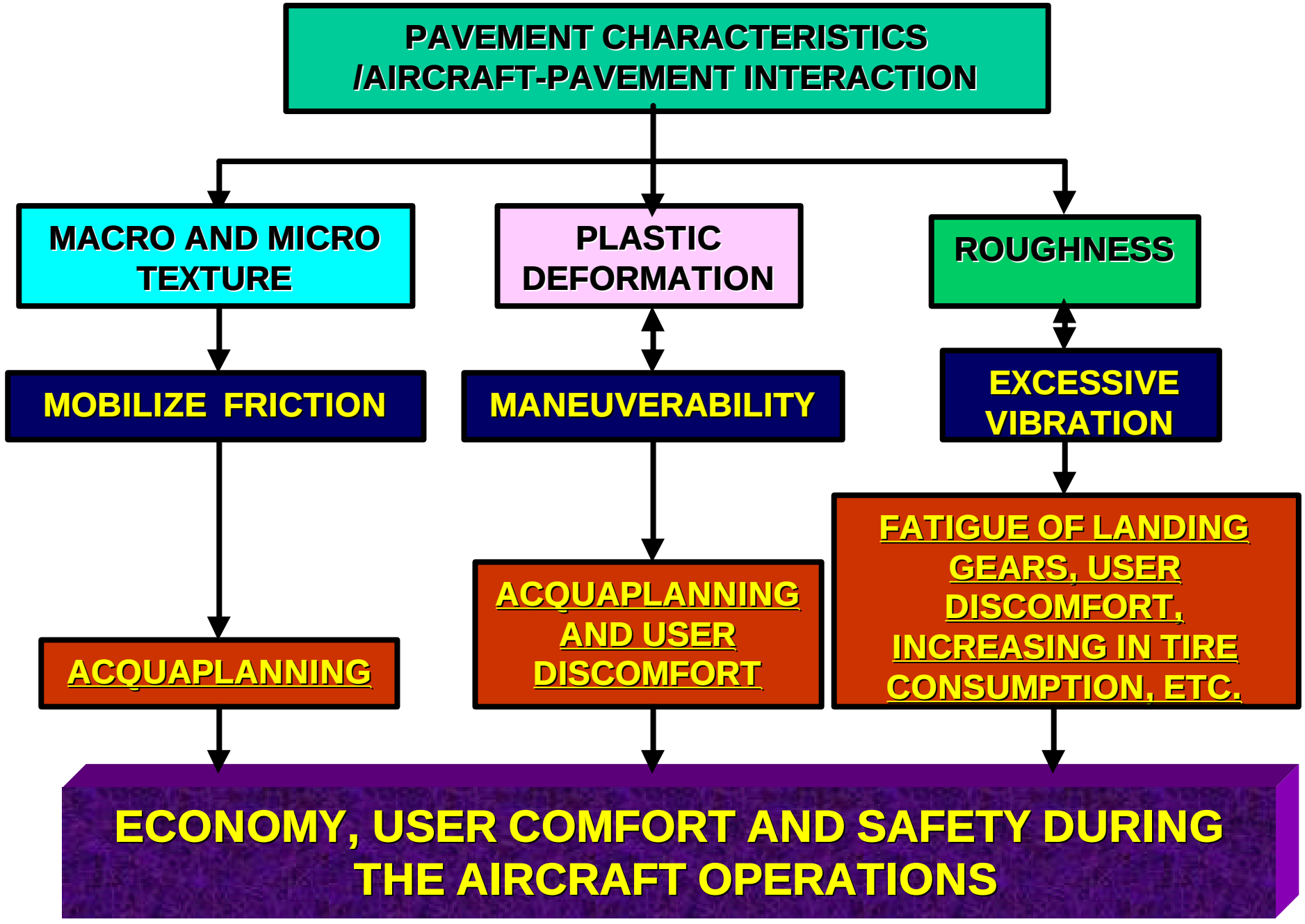
**TOTAL OPTIMIZATION**

# "OVERVIEW ON PMS BASIC CONCEPTS"

## WHY SYSTEMS?



# WHY SYSTEMS ?


PAVEMENT CHARACTERISTICS /AIRCRAFT-PAVEMENT INTERACTION
MACRO AND MICRO TEXTURE
PLASTIC DEFORMATION
ROUGHNESS
MOBILIZE FRICTION
MANEUVERABILITY
EXCESSIVE VIBRATION
ACQUAPLANNING
ACQUAPLANNING AND USER DISCOMFORT
FATIGUE OF LANDING GEARS, USER DISCOMFORT, INCREASING IN TIRE CONSUMPTION, ETC.
ECONOMY, USER COMFORT AND SAFETY DURING THE AIRCRAFT OPERATIONS

# "OVERVIEW ON PMS BASIC CONCEPTS"

## PMS LEVELS

### NETWORK LEVEL

IT LOOKS FOR THE ORDER, HIERARCHY AND THE PRIORITIZATION OF THE PAVEMENT M & R NEEDS OF THE NETWORK

IT INTERESTS TO ADMINISTRATORS, LEGISLATORS AND POLITICIANS

# “OVERVIEW ON PMS BASIC CONCEPTS”

## PMS LEVELS

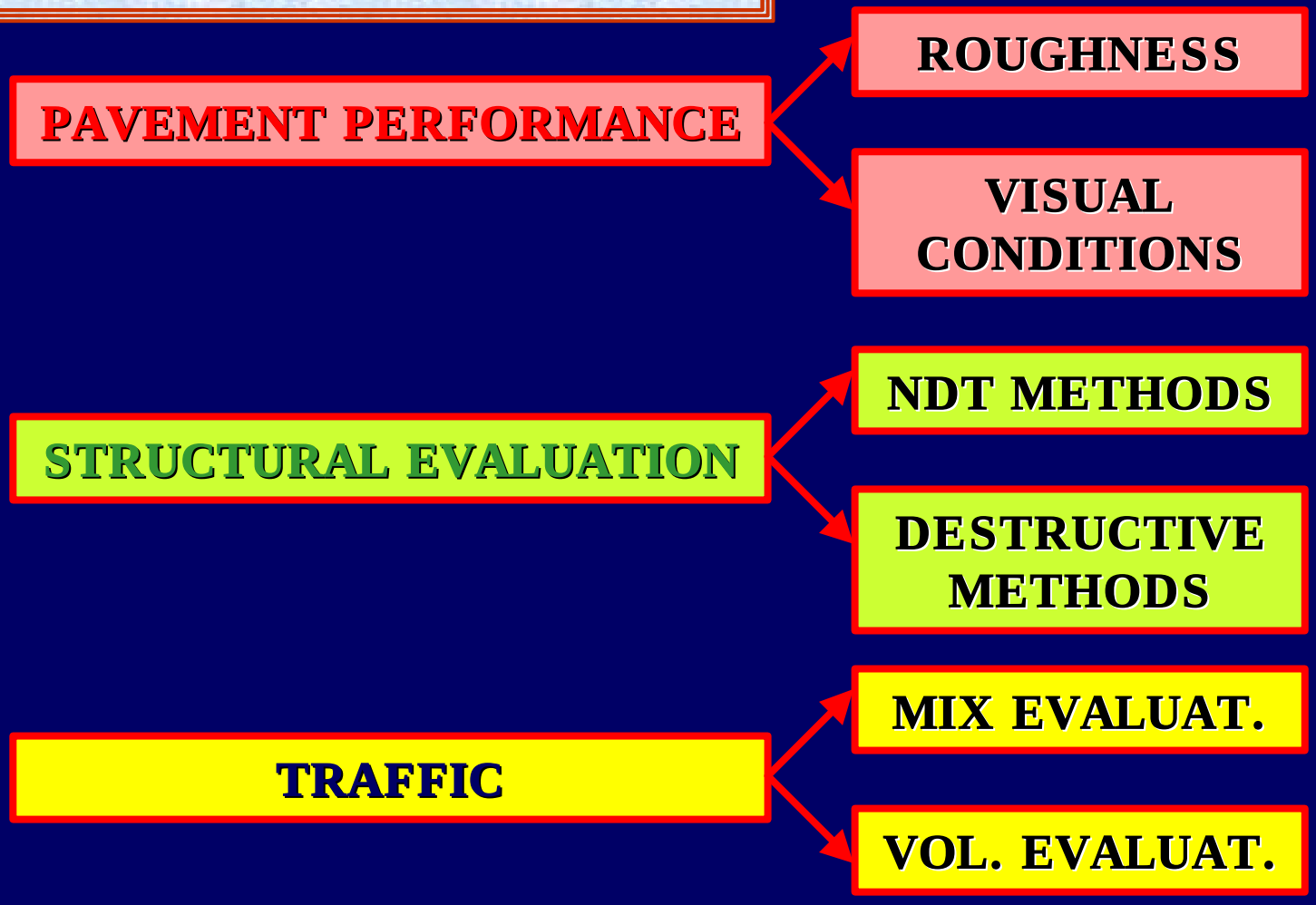
### PROJECT LEVEL

IT LOOKS FOR THE GENERATION OF ALTERNATIVES, MAINTENANCE STRATEGIES & REHABILITATIONS & RECUPERATIONS OF THE PAVEMENTS

IT INTERESTS TO ENGINEERS AND TECHNICIANS

# “OVERVIEW ON PMS BASIC CONCEPTS”

## DATA COLLECTION



# “OVERVIEW ON PMS BASIC CONCEPTS”

## DATA COLLECTION

**SAFETY**

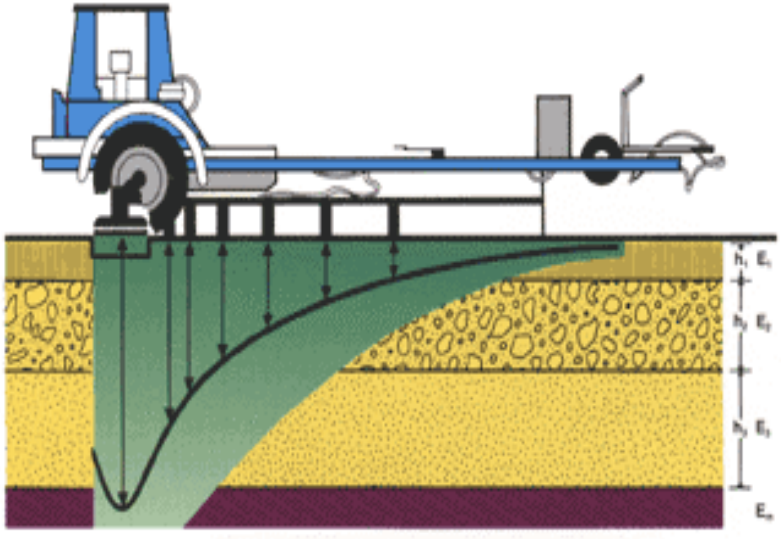
- **SKID RESIST.**
- **SIGNALLING**

**COSTS**

$$T_C = I_C + M_C + U_C$$


Dynatest 8000
JM 25 92


Dynatest

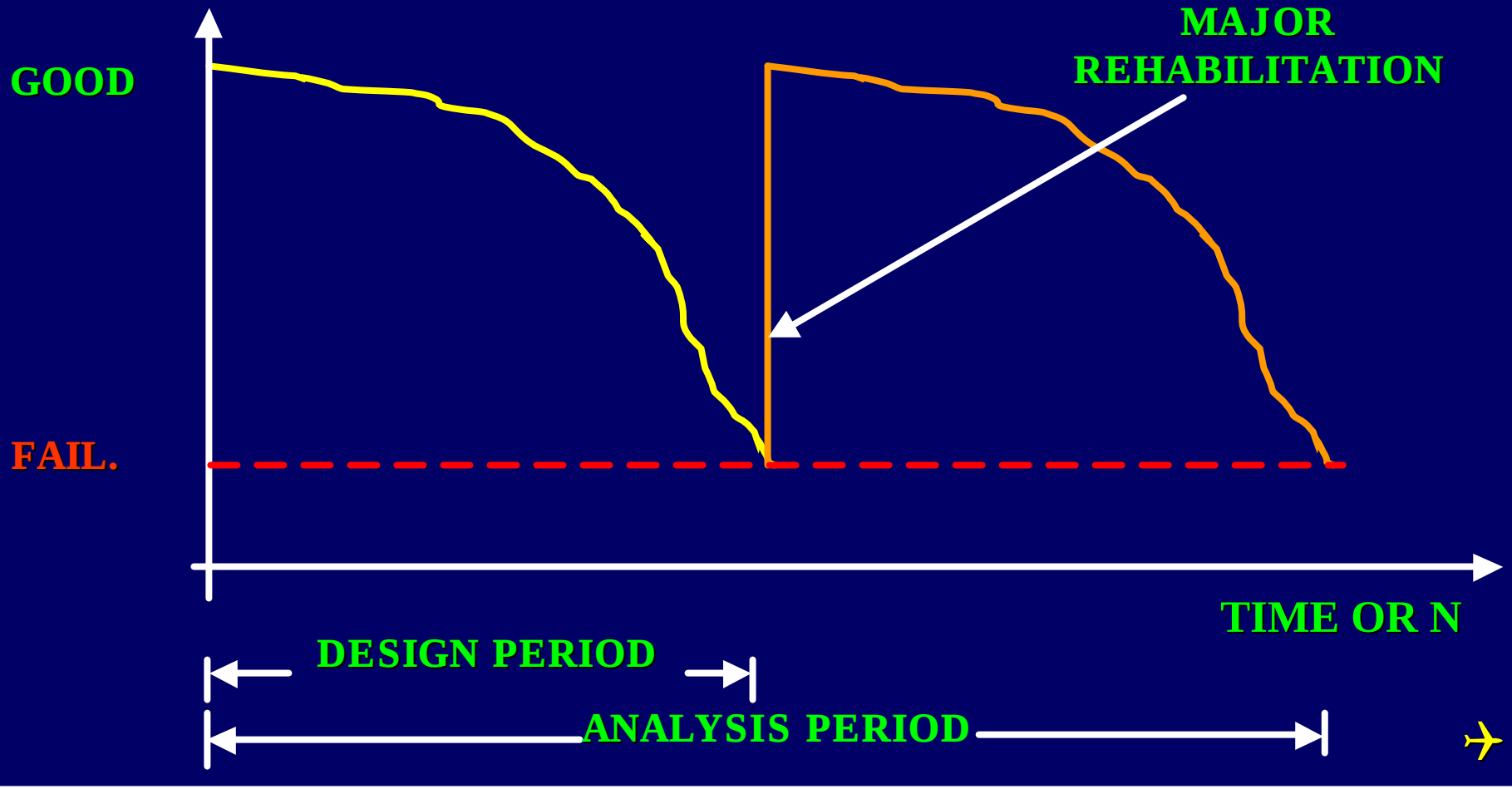



PAVEMENT
FRICTION
TESTER


5

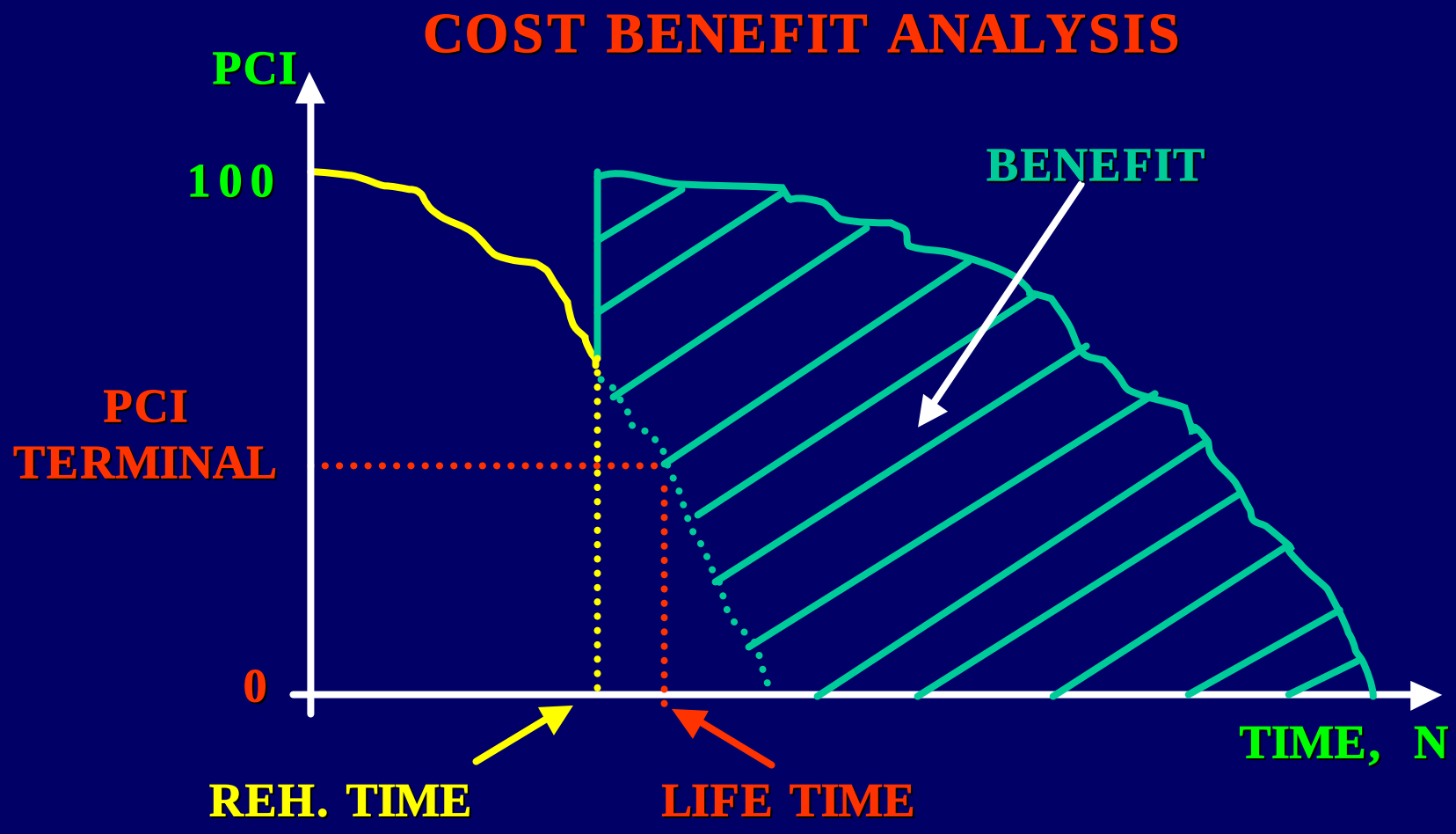
# “OVERVIEW ON PMS BASIC CONCEPTS”

## HOW DOES A PMS WORK?



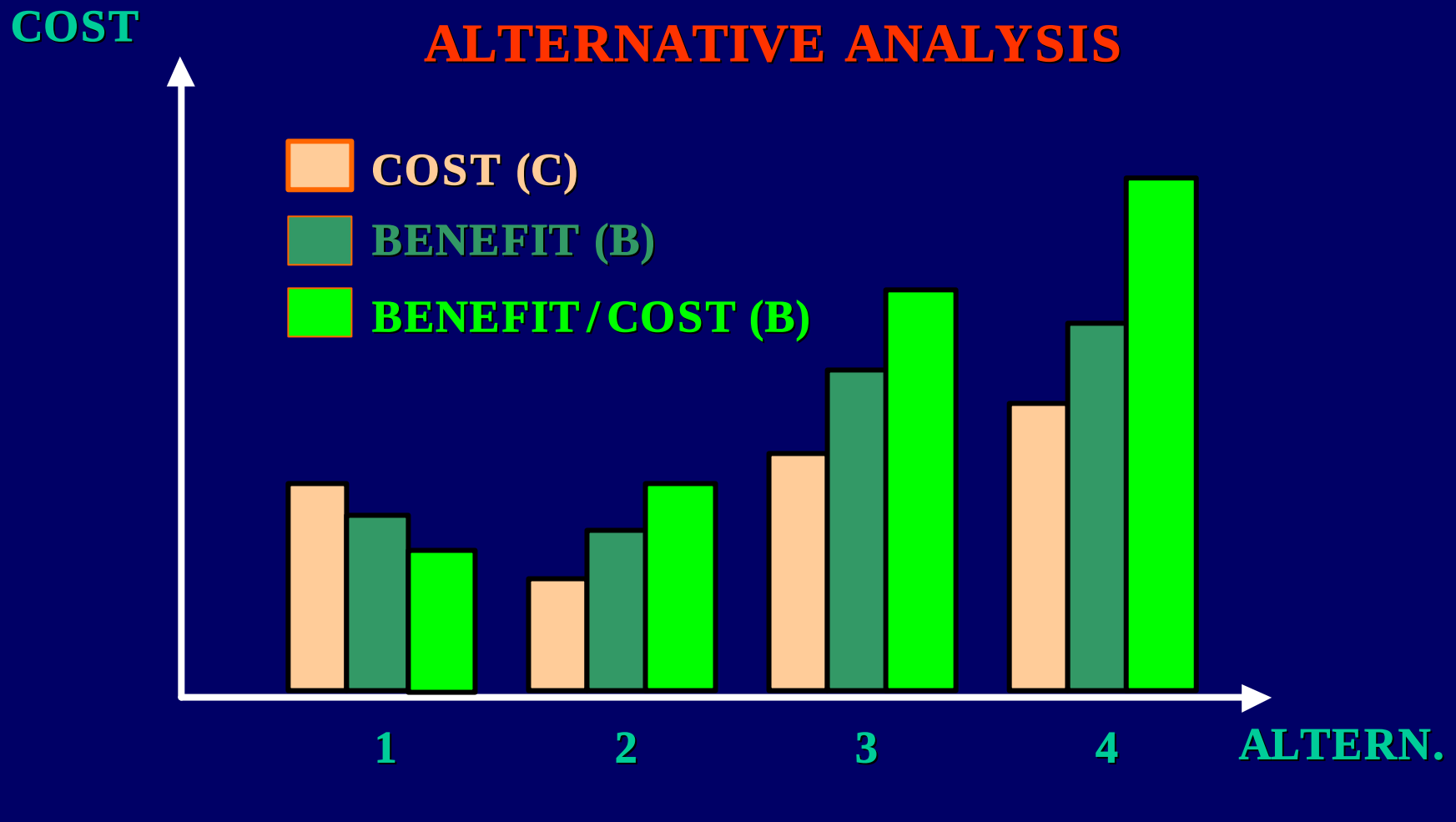
# “OVERVIEW ON PMS BASIC CONCEPTS”

## HOW DOES A PMS WORK?



# “OVERVIEW ON PMS BASIC CONCEPTS”

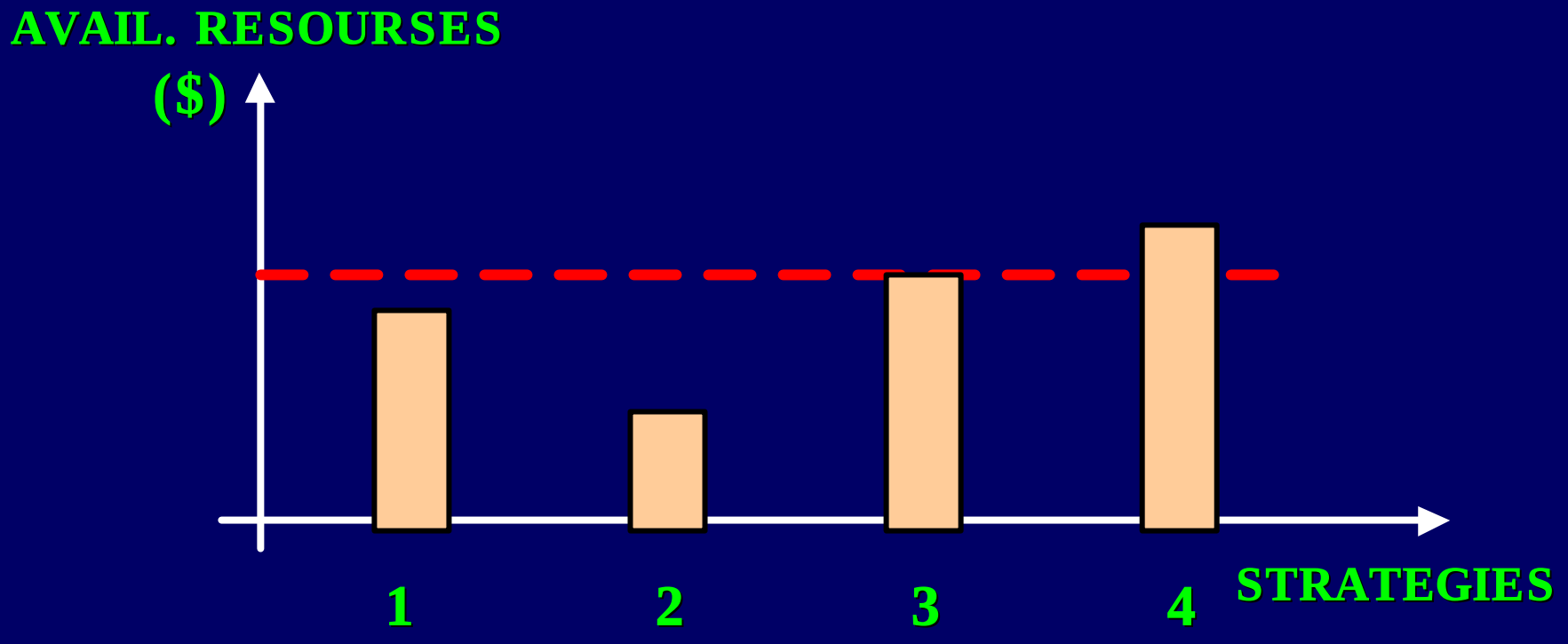
## HOW DOES A PMS WORK?



# “OVERVIEW ON PMS BASIC CONCEPTS”

## HOW DOES A PMS WORK?

### VIABLE ALTERNATIVE ANALYSIS



# “OVERVIEW ON PMS BASIC CONCEPTS”

## HOW DOES A PMS WORK?

| SECTION I | SECTION II | SECTION III |
|---|---|---|

**COSTS FOR PAVEMENT RECUPERATION ($10^6$ $)**

| YEAR | SECTION I | SECTION II | SECTION III |
|---|---|---|---|
| 2005 | 10 | 30 | 50 |
| 2006 | 20 | 40 | 60 |
| 2007 | 30 | 50 | 70 |

# “OVERVIEW ON PMS BASIC CONCEPTS”

## HOW DOES A PMS WORK?

### BUDGET FORECAST

| YEAR | AVAILABLE RESOURCES ($10^6$ $) |
|---|---|
| 2005 | 50 |
| 2006 | 55 |
| 2007 | 30 |

# "OVERVIEW ON PMS BASIC CONCEPTS"

## HOW DOES A PMS WORK?

### STRATEGY I

| YEAR | SECTION I | SECTION II | SECTION III | TOTAL ($10^6$ $) |
|---|---|---|---|---|
| 2005 | 0 | 0 | 50 | 50 |
| 2006 | 0 | 40 | 0 | 40 |
| 2007 | 30 | 0 | 0 | 30 |

### STRATEGY II

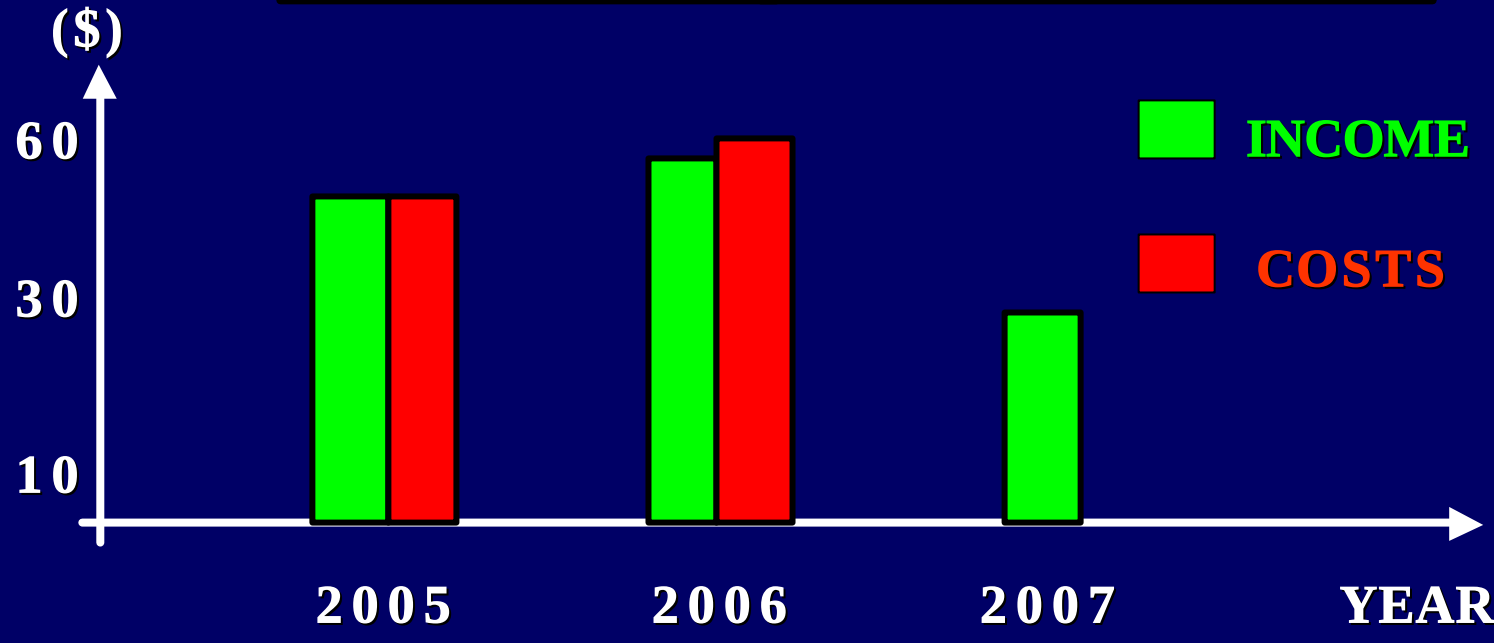
| YEAR | SECTION I | SECTION II | SECTION III | TOTAL ($10^6$ $) |
|---|---|---|---|---|
| 2005 | 0 | 0 | 50 | 50 |
| 2006 | 20 | 40 | 0 | 60 |
| 2007 | 0 | 0 | 0 | 0 |

# “OVERVIEW ON PMS BASIC CONCEPTS”

## HOW DOES A PMS WORK?

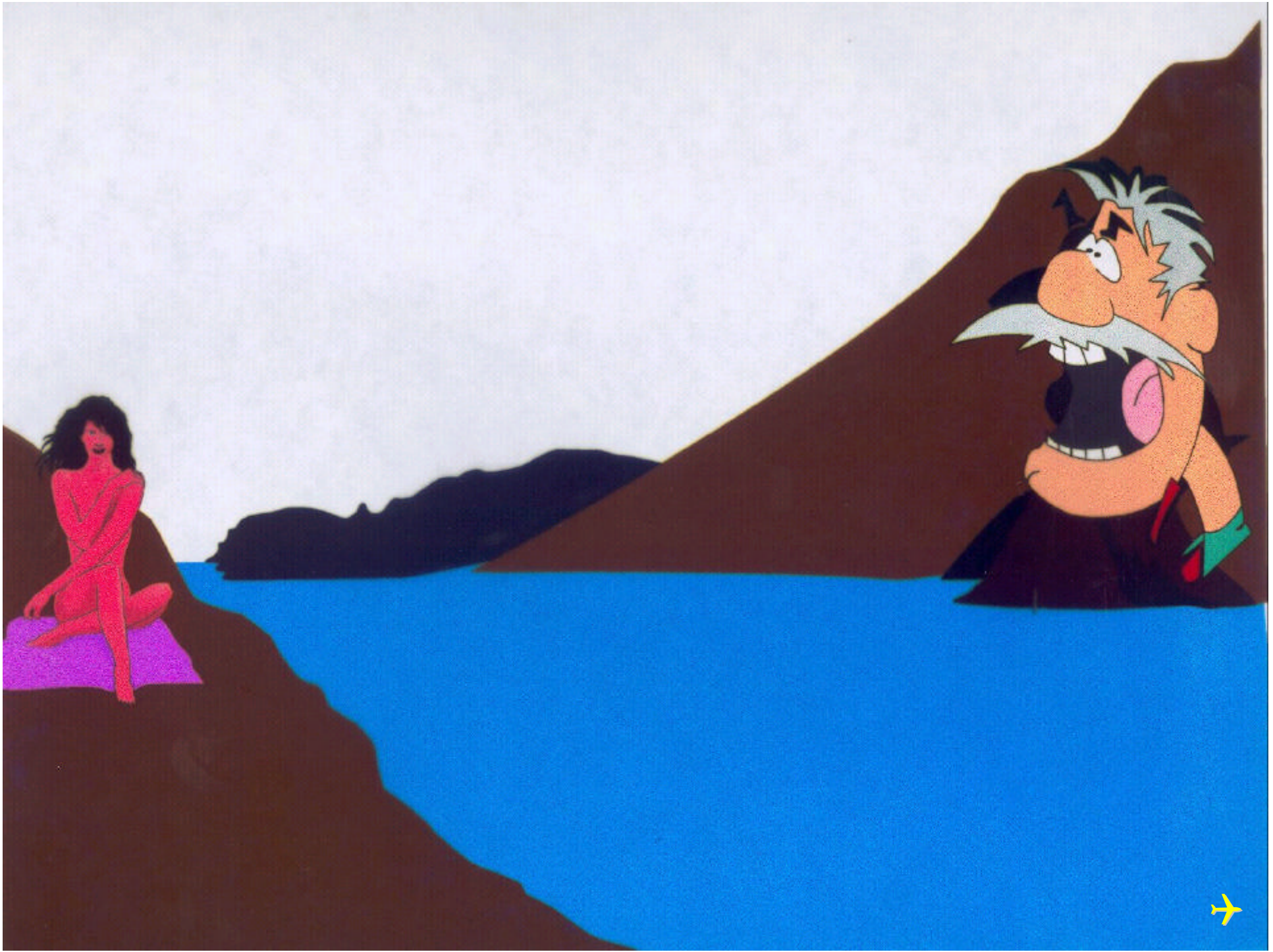
### ALTERNATIVE TOTAL

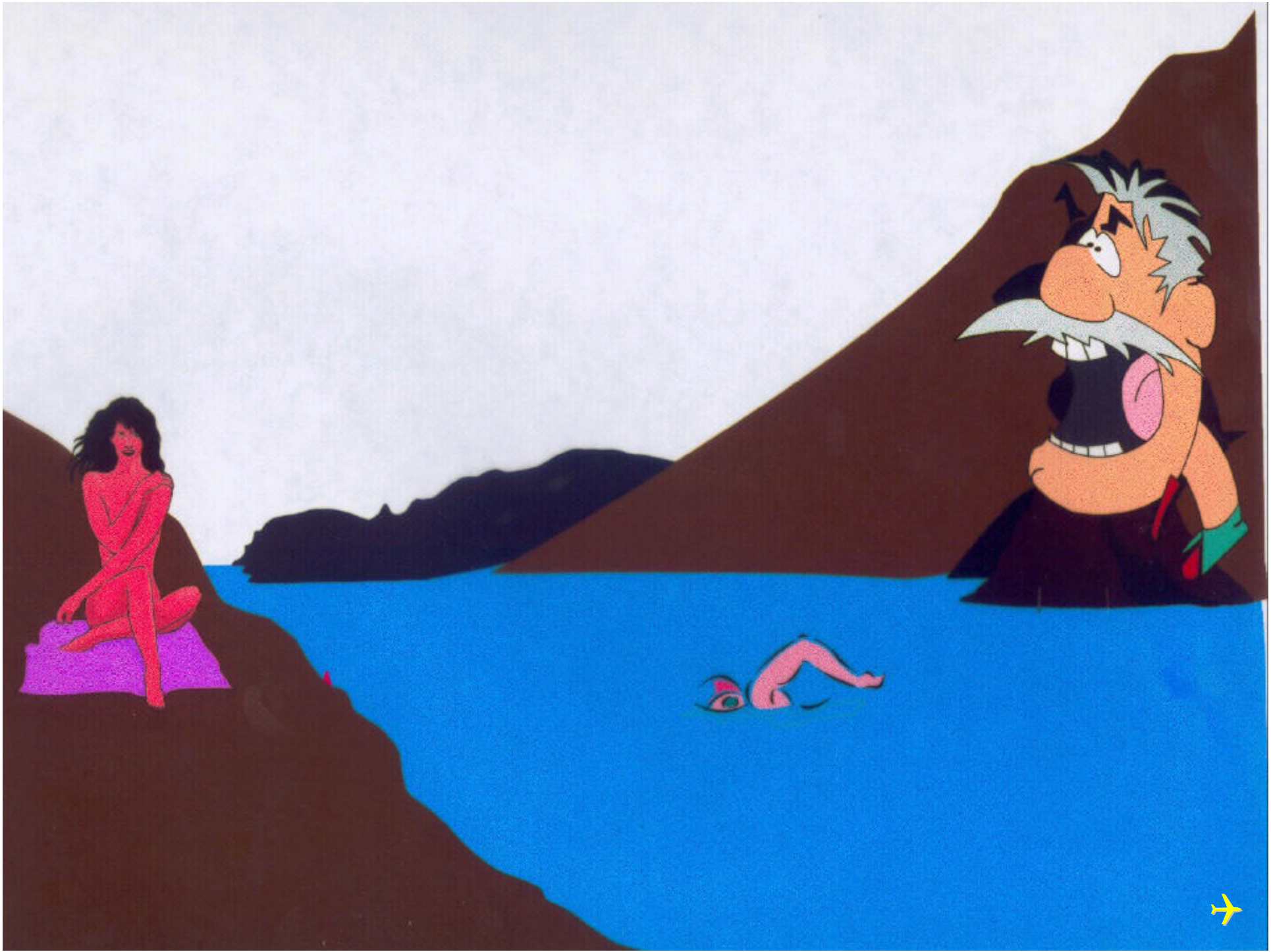
| STRATEGY | TOTAL COST ($10^6$ $) |
|---|---|
| 1 | 120 |
| 2 | 110 |

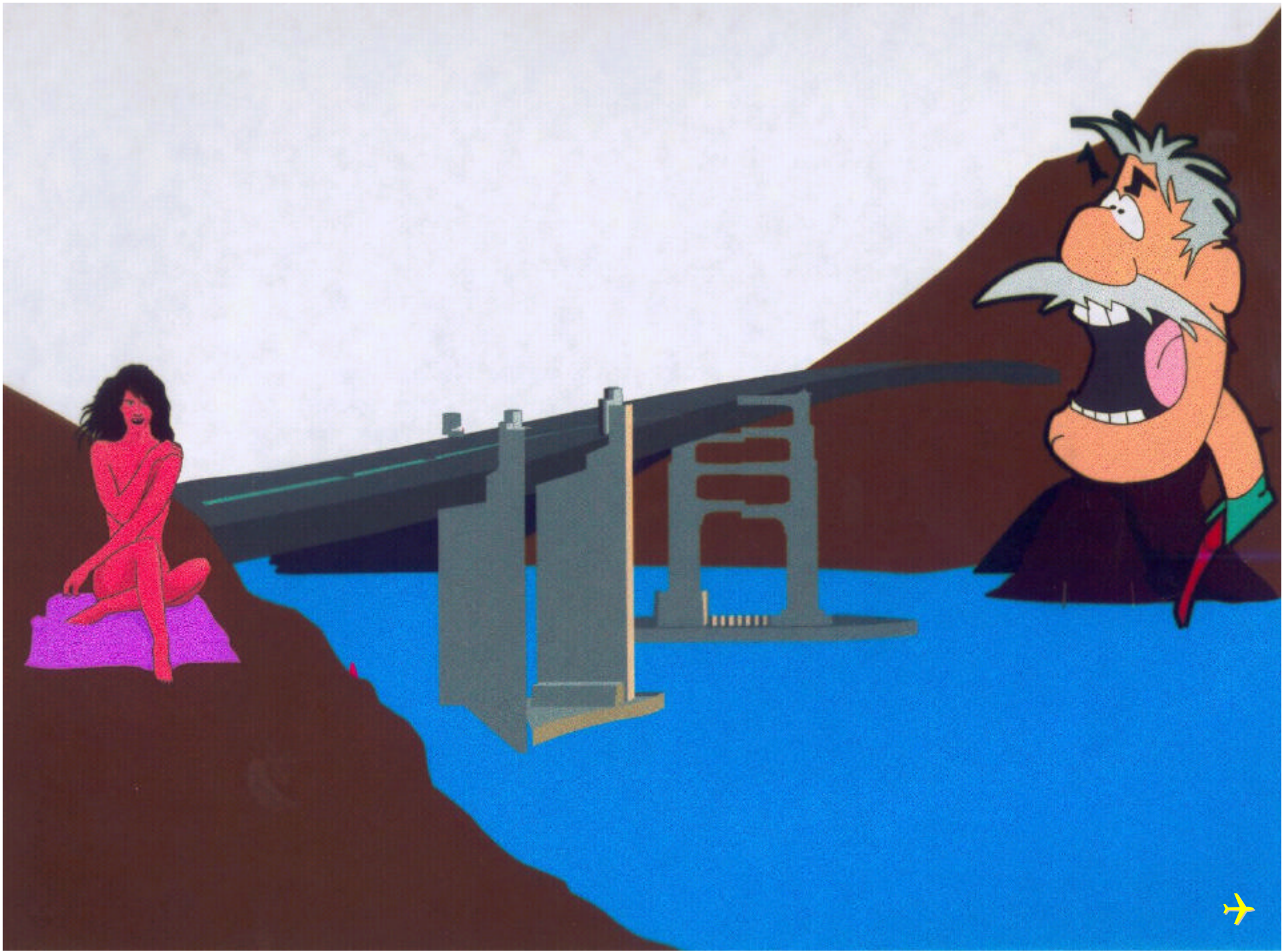


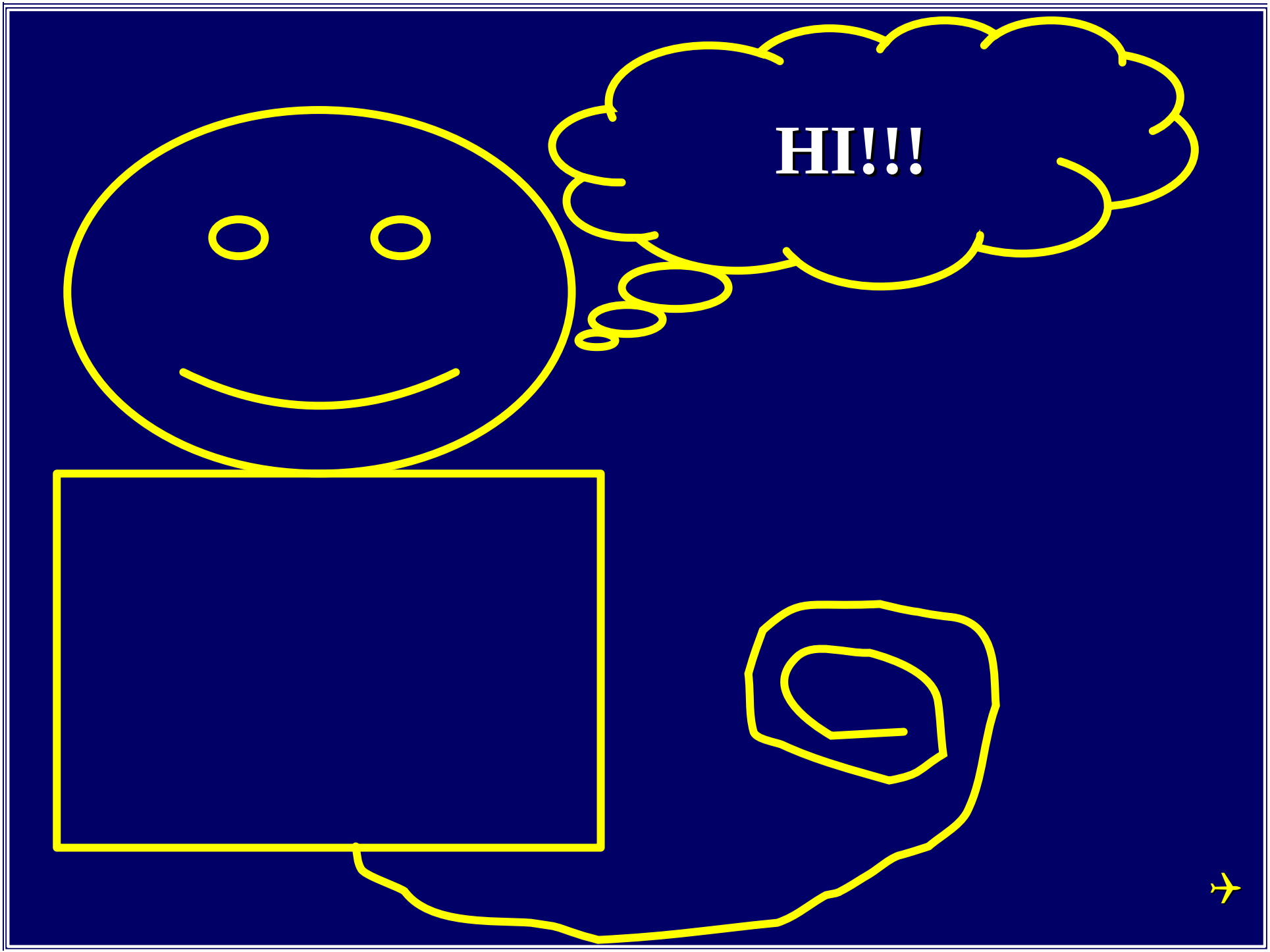
# “OVERVIEW ON PMS BASIC CONCEPTS”

## SHOULD A PMS BE SOPHISTICATED ?





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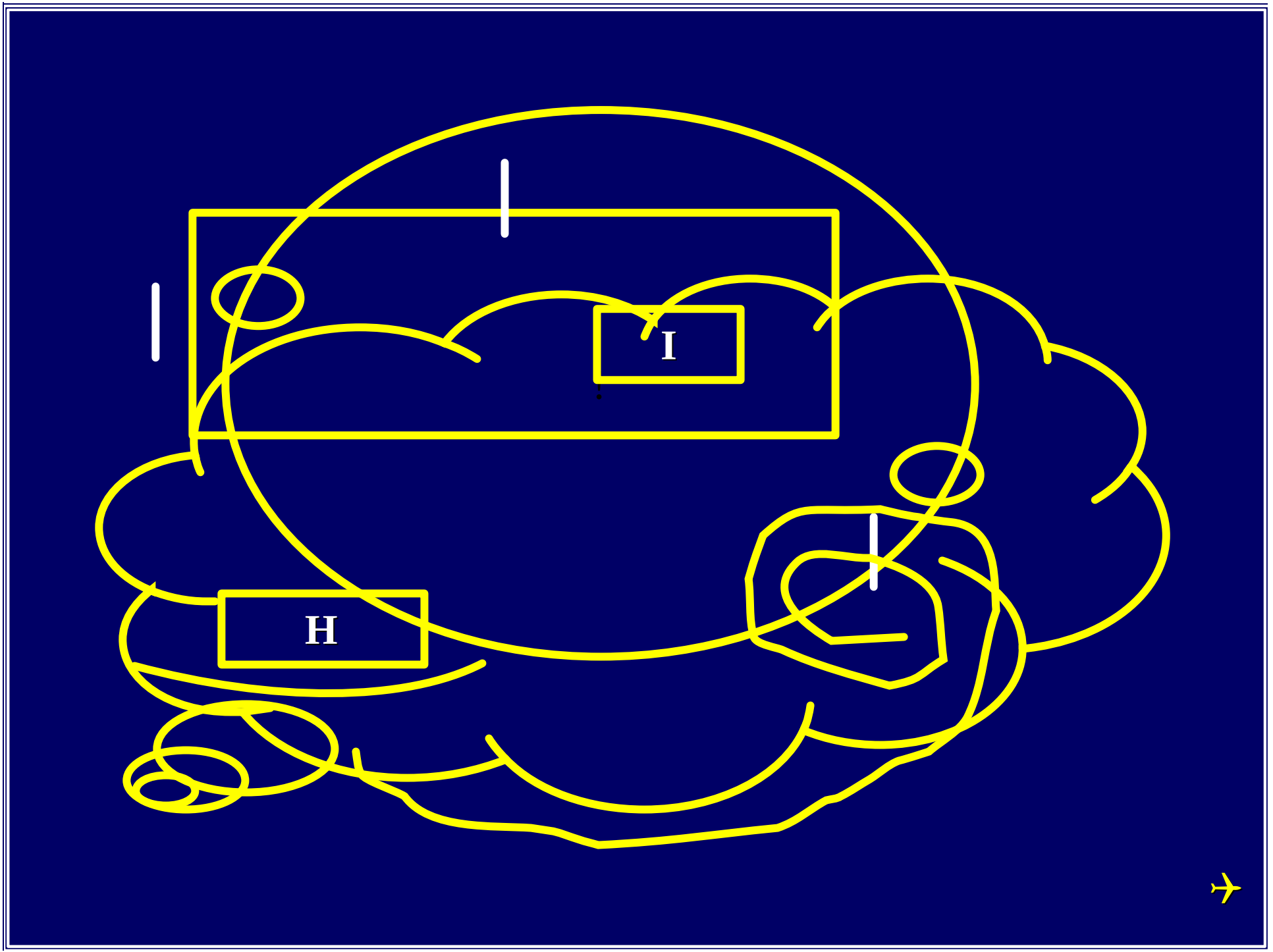
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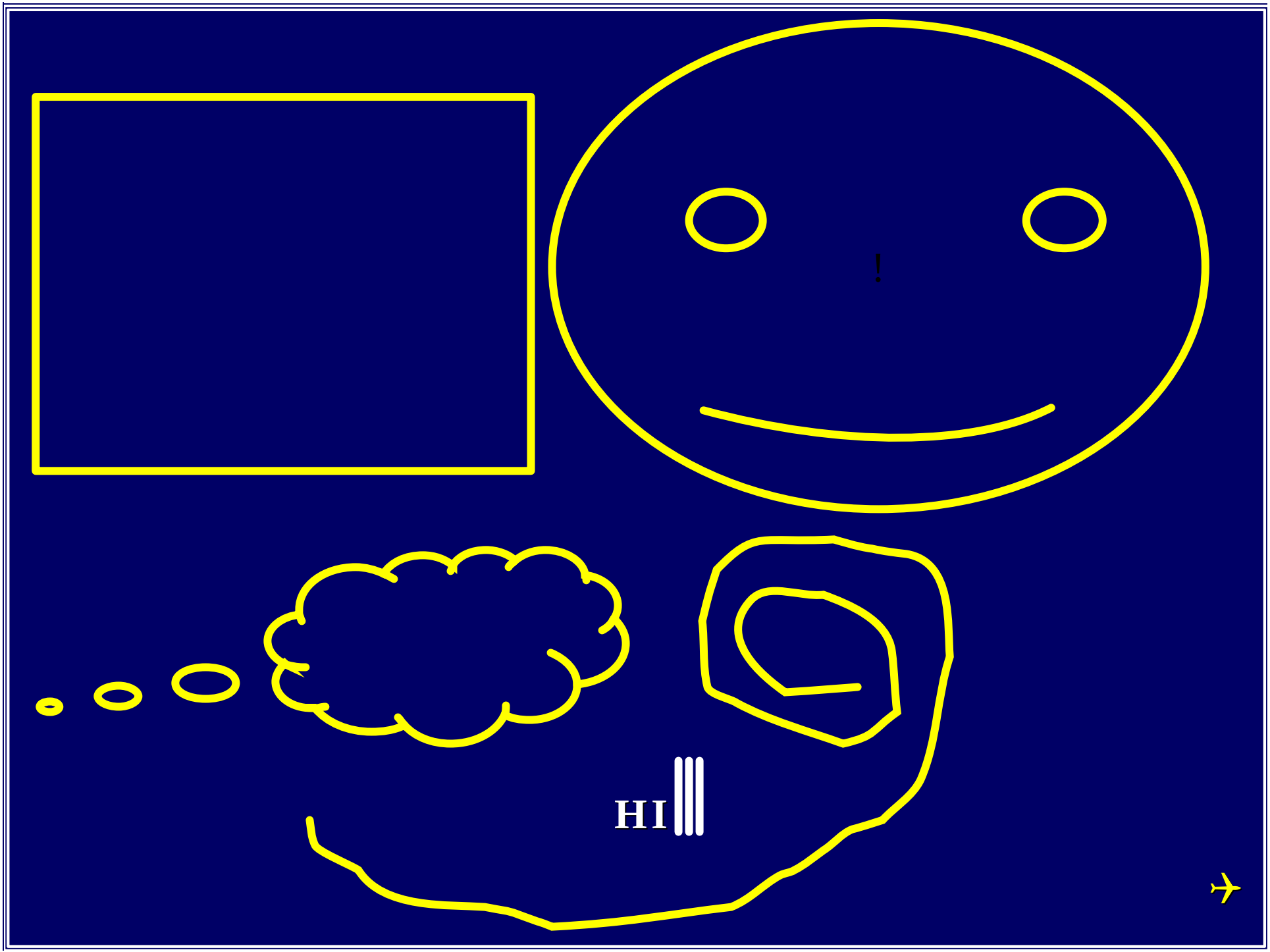
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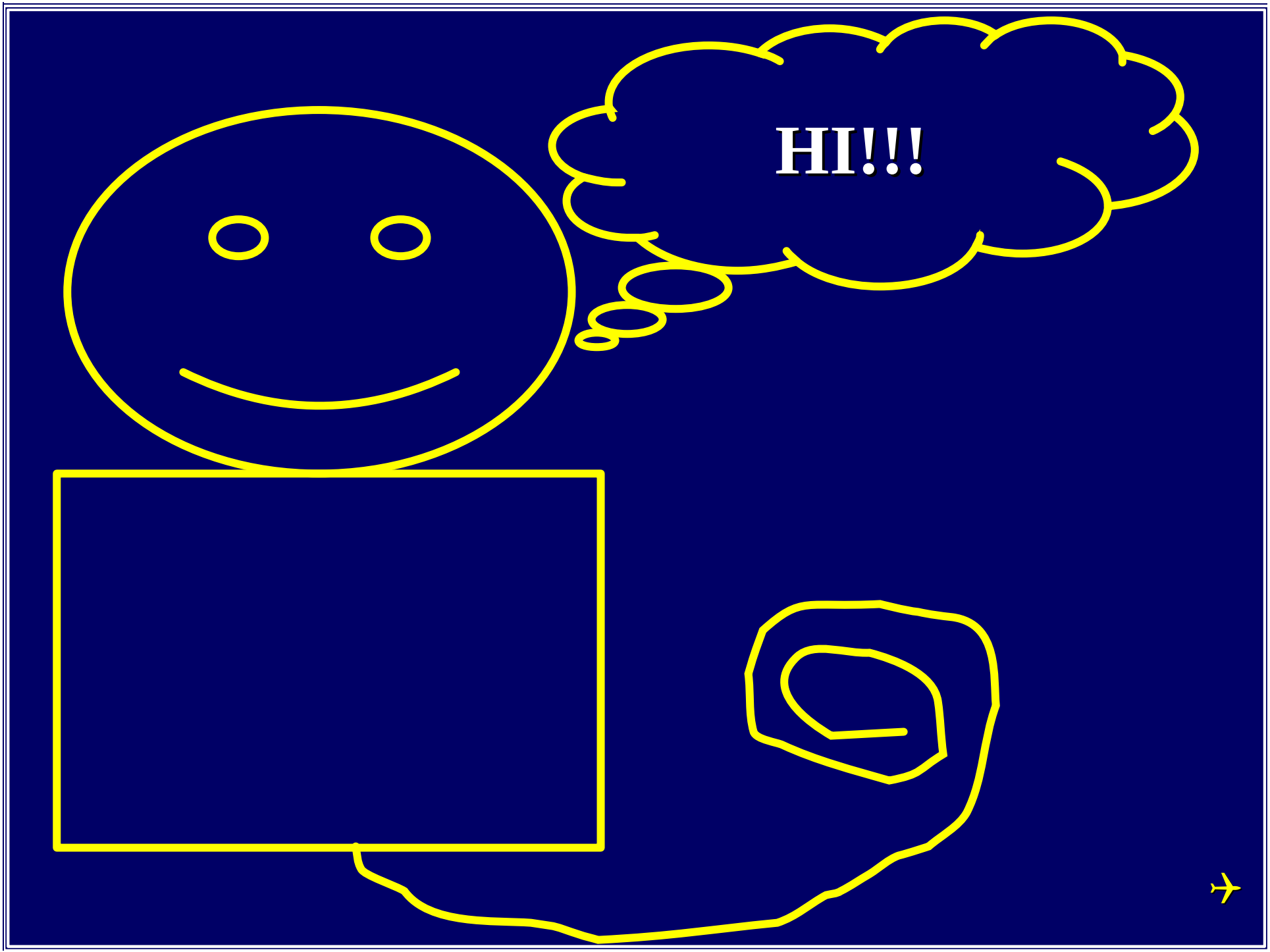
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# "OVERVIEW ON PMS BASIC CONCEPTS"

## CONCLUSIONS

- MAN-MACHINE INTERACTION
- DECISION MAKING PROCESS → TOTAL OPTIMIZATION
- ENVIRONMENT & LOAD EFFECT → AASHO ROAD TEST
- PAVEMENT QUALITY vs TIME → PERFORMANCE
- PMS CONCEPT → PMS SUBSYSTEMS
- PMS OBJECTIVE → PLANN., PRIORITY & RATIONAL. PUBLIC INVEST.

# "OVERVIEW ON PMS BASIC CONCEPTS"

## CONCLUSIONS

- PMS LEVELS → NETWORK AND PROJECT
- DATA COLLECTION → EVAL. FUNC. & STRUC., TRAFFIC, SAFETY & COSTS
- $T_C = I_C + M_C + U_C$
- SIMPLE EXAMPLE ON HOW PMS WORKS
- LEVELS OF PMS SOPHISTICATION


“NUESTRAS DUDAS SON TRAICIONERAS, Y NOS HACEN PERDER, LO QUE, CON FRECUENCIA, PODRÍAMOS GANAR, POR SIMPLE MEDO DE ARRIESGAR”
WILLIAM SHAKESPEARE