THE UNIVERSITY OF CALGARY

# Distributed Training in the Canadian Forces: A Decision-Model

by

Elizabeth A. Syvertsen-Bitten

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- General 0515
- Administration 0514
- Adult and Continuing 0516
- Agricultural 0517
- Art 0273
- Bilingual and Multicultural 0282
- Business 0688
- Community College 0275
- Curriculum and Instruction 0727
- Early Childhood 0518
- Elementary 0524
- Finance 0277
- Guidance and Counseling 0519
- Health 0680
- Higher 0745
- History of 0520
- Home Economics 0278
- Industrial 0521
- Language and Literature 0279
- Mathematics 0280
- Music 0522
- Philosophy of 0998
- Physical 0523
- Psychology 0525
- Reading 0535
- Religious 0527
- Sciences 0714
- Secondary 0533
- Social Sciences 0534
- Sociology of 0340
- Special 0529
- Teacher Training 0530
- Technology 0710
- Tests and Measurements 0288
- Vocational 0747

### LANGUAGE, LITERATURE AND LINGUISTICS
- Language
  - General 0679
  - Ancient 0289
  - Linguistics 0290
  - Modern 0291
- Literature
  - General 0401
  - Classical 0294
  - Comparative 0295
  - Medieval 0297
  - Modern 0298
  - African 0316
  - American 0591
  - Asian 0305
  - Canadian (English) 0352
  - Canadian (French) 0355
  - English 0593
  - Germanic 0311
  - Latin American 0312
  - Middle Eastern 0315
  - Romance 0313
  - Slavic and East European 0314

### PHILOSOPHY, RELIGION AND THEOLOGY
- Philosophy 0422
- Religion
  - General 0318
  - Biblical Studies 0321
  - Clergy 0319
  - History of 0320
  - Philosophy of 0322
- Theology 0469

### SOCIAL SCIENCES
- American Studies 0323
- Anthropology
  - Archaeology 0324
  - Cultural 0326
  - Physical 0327
- Business Administration
  - General 0310
  - Accounting 0272
  - Banking 0770
  - Management 0454
  - Marketing 0338
- Canadian Studies 0385
- Economics
  - General 0501
  - Agricultural 0503
  - Commerce-Business 0505
  - Finance 0508
  - History 0509
  - Labor 0510
  - Theory 0511
- Folklore 0358
- Geography 0366
- Gerontology 0351
- History
  - General 0578
  - Ancient 0579
  - Medieval 0581
  - Modern 0582
  - Black 0328
  - African 0331
  - Asia, Australia and Oceania 0332
  - Canadian 0334
  - European 0335
  - Latin American 0336
  - Middle Eastern 0333
  - United States 0337
- History of Science 0585
- Law 0398
- Political Science
  - General 0615
  - International Law and Relations 0616
  - Public Administration 0617
- Recreation 0814
- Social Work 0452
- Sociology
  - General 0626
  - Criminology and Penology 0627
  - Demography 0938
  - Ethnic and Racial Studies 0631
  - Individual and Family Studies 0628
  - Industrial and Labor Relations 0629
  - Public and Social Welfare 0630
  - Social Structure and Development 0700
  - Theory and Methods 0344
- Transportation 0709
- Urban and Regional Planning 0999
- Women's Studies 0453

# THE SCIENCES AND ENGINEERING

### BIOLOGICAL SCIENCES
- Agriculture
  - General 0473
  - Agronomy 0285
  - Animal Culture and Nutrition 0475
  - Animal Pathology 0476
  - Food Science and Technology 0359
  - Forestry and Wildlife 0478
  - Plant Culture 0479
  - Plant Pathology 0480
  - Plant Physiology 0817
  - Range Management 0777
  - Wood Technology 0746
- Biology
  - General 0306
  - Anatomy 0287
  - Biostatistics 0308
  - Botany 0309
  - Cell 0379
  - Ecology 0329
  - Entomology 0353
  - Genetics 0369
  - Limnology 0793
  - Microbiology 0410
  - Molecular 0307
  - Neuroscience 0317
  - Oceanography 0416
  - Physiology 0433
  - Radiation 0821
  - Veterinary Science 0778
  - Zoology 0472
- Biophysics
  - General 0786
  - Medical 0760

### EARTH SCIENCES
- Biogeochemistry 0425
- Geochemistry 0996
- Geodesy 0370
- Geology 0372
- Geophysics 0373
- Hydrology 0388
- Mineralogy 0411
- Paleobotany 0345
- Paleoecology 0426
- Paleontology 0418
- Paleozoology 0985
- Palynology 0427
- Physical Geography 0368
- Physical Oceanography 0415

### HEALTH AND ENVIRONMENTAL SCIENCES
- Environmental Sciences 0768
- Health Sciences
  - General 0566
  - Audiology 0300
  - Chemotherapy 0992
  - Dentistry 0567
  - Education 0350
  - Hospital Management 0769
  - Human Development 0758
  - Immunology 0982
  - Medicine and Surgery 0564
  - Mental Health 0347
  - Nursing 0569
  - Nutrition 0570
  - Obstetrics and Gynecology 0380
  - Occupational Health and Therapy 0354
  - Ophthalmology 0381
  - Pathology 0571
  - Pharmacology 0419
  - Pharmacy 0572
  - Physical Therapy 0382
  - Public Health 0573
  - Radiology 0574
  - Recreation 0575
  - Speech Pathology 0460
  - Toxicology 0383
- Home Economics 0386

### PHYSICAL SCIENCES

#### Pure Sciences
- Chemistry
  - General 0485
  - Agricultural 0749
  - Analytical 0486
  - Biochemistry 0487
  - Inorganic 0488
  - Nuclear 0738
  - Organic 0490
  - Pharmaceutical 0491
  - Physical 0494
  - Polymer 0495
  - Radiation 0754
- Mathematics 0405
- Physics
  - General 0605
  - Acoustics 0986
  - Astronomy and Astrophysics 0606
  - Atmospheric Science 0608
  - Atomic 0748
  - Electronics and Electricity 0607
  - Elementary Particles and High Energy 0798
  - Fluid and Plasma 0759
  - Molecular 0609
  - Nuclear 0610
  - Optics 0752
  - Radiation 0756
  - Solid State 0611
- Statistics 0463

#### Applied Sciences
- Applied Mechanics 0346
- Computer Science 0984
- Engineering
  - General 0537
  - Aerospace 0538
  - Agricultural 0539
  - Automotive 0540
  - Biomedical 0541
  - Chemical 0542
  - Civil 0543
  - Electronics and Electrical 0544
  - Heat and Thermodynamics 0348
  - Hydraulic 0545
  - Industrial 0546
  - Marine 0547
  - Materials Science 0794
  - Mechanical 0548
  - Metallurgy 0743
  - Mining 0551
  - Nuclear 0552
  - Packaging 0549
  - Petroleum 0765
  - Sanitary and Municipal 0554
  - System Science 0790
- Geotechnology 0428
- Operations Research 0796
- Plastics Technology 0795
- Textile Technology 0994

### PSYCHOLOGY
- General 0621
- Behavioral 0384
- Clinical 0622
- Developmental 0620
- Experimental 0623
- Industrial 0624
- Personality 0625
- Physiological 0989
- Psychobiology 0349
- Psychometrics 0632
- Social 0451

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Architecture ..... 0729
Beaux-arts ..... 0357
Bibliothéconomie ..... 0399
Cinéma ..... 0900
Communication verbale ..... 0459
Communications ..... 0708
Danse ..... 0378
Histoire de l'art ..... 0377
Journalisme ..... 0391
Musique ..... 0413
Sciences de l'information ..... 0723
Théâtre ..... 0465

### ÉDUCATION
Généralités ..... 515
Administration ..... 0514
Art ..... 0273
Collèges communautaires ..... 0275
Commerce ..... 0688
Économie domestique ..... 0278
Éducation permanente ..... 0516
Éducation préscolaire ..... 0518
Éducation sanitaire ..... 0680
Enseignement agricole ..... 0517
Enseignement bilingue et multiculturel ..... 0282
Enseignement industriel ..... 0521
Enseignement primaire. ..... 0524
Enseignement professionnel ..... 0747
Enseignement religieux ..... 0527
Enseignement secondaire ..... 0533
Enseignement spécial ..... 0529
Enseignement supérieur ..... 0745
Évaluation ..... 0288
Finances ..... 0277
Formation des enseignants ..... 0530
Histoire de l'éducation ..... 0520
Langues et littérature ..... 0279
Lecture ..... 0535
Mathématiques ..... 0280
Musique ..... 0522
Orientation et consultation ..... 0519
Philosophie de l'éducation ..... 0998
Physique ..... 0523
Programmes d'études et enseignement ..... 0727
Psychologie ..... 0525
Sciences ..... 0714
Sciences sociales ..... 0534
Sociologie de l'éducation ..... 0340
Technologie ..... 0710

### LANGUE, LITTÉRATURE ET LINGUISTIQUE
Langues
- Généralités ..... 0679
- Anciennes ..... 0289
- Linguistique ..... 0290
- Modernes ..... 0291

Littérature
- Généralités ..... 0401
- Anciennes ..... 0294
- Comparée ..... 0295
- Médiévale ..... 0297
- Moderne ..... 0298
- Africaine ..... 0316
- Américaine ..... 0591
- Anglaise ..... 0593
- Asiatique ..... 0305
- Canadienne (Anglaise) ..... 0352
- Canadienne (Française) ..... 0355
- Germanique ..... 0311
- Latino-américaine ..... 0312
- Moyen-orientale ..... 0315
- Romane ..... 0313
- Slave et est-européenne ..... 0314

### PHILOSOPHIE, RELIGION ET THÉOLOGIE
Philosophie ..... 0422
Religion
- Généralités ..... 0318
- Clergé ..... 0319
- Études bibliques ..... 0321
- Histoire des religions ..... 0320
- Philosophie de la religion ..... 0322

Théologie ..... 0469

### SCIENCES SOCIALES
Anthropologie
- Archéologie ..... 0324
- Culturelle ..... 0326
- Physique ..... 0327

Droit ..... 0398
Économie
- Généralités ..... 0501
- Commerce-Affaires ..... 0505
- Économie agricole ..... 0503
- Économie du travail ..... 0510
- Finances ..... 0508
- Histoire ..... 0509
- Théorie ..... 0511

Études américaines ..... 0323
Études canadiennes ..... 0385
Études féministes ..... 0453
Folklore ..... 0358
Géographie ..... 0366
Gérontologie ..... 0351
Gestion des affaires
- Généralités ..... 0310
- Administration ..... 0454
- Banques ..... 0770
- Comptabilité ..... 0272
- Marketing ..... 0338

Histoire
- Histoire générale ..... 0578
- Ancienne ..... 0579
- Médiévale ..... 0581
- Moderne ..... 0582
- Histoire des noirs ..... 0328
- Africaine ..... 0331
- Canadienne ..... 0334
- États-Unis ..... 0337
- Européenne ..... 0335
- Moyen-orientale ..... 0333
- Latino-américaine ..... 0336
- Asie, Australie et Océanie ..... 0332

Histoire des sciences ..... 0585
Loisirs ..... 0814
Planification urbaine et régionale ..... 0999
Science politique
- Généralités ..... 0615
- Administration publique ..... 0617
- Droit et relations internationales ..... 0616

Sociologie
- Généralités ..... 0626
- Aide et bien-être social ..... 0630
- Criminologie et établissements pénitentiaires ..... 0627
- Démographie ..... 0938
- Études de l' individu et de la famille ..... 0628
- Études des relations interethniques et des relations raciales ..... 0631
- Structure et développement social ..... 0700
- Théorie et méthodes. ..... 0344
- Travail et relations industrielles ..... 0629

Transports ..... 0709
Travail social ..... 0452

# SCIENCES ET INGÉNIERIE

### SCIENCES BIOLOGIQUES
Agriculture
- Généralités ..... 0473
- Agronomie. ..... 0285
- Alimentation et technologie alimentaire ..... 0359
- Culture ..... 0479
- Élevage et alimentation ..... 0475
- Exploitation des pâturages ..... 0777
- Pathologie animale ..... 0476
- Pathologie végétale ..... 0480
- Physiologie végétale ..... 0817
- Sylviculture et faune ..... 0478
- Technologie du bois ..... 0746

Biologie
- Généralités ..... 0306
- Anatomie ..... 0287
- Biologie (Statistiques) ..... 0308
- Biologie moléculaire ..... 0307
- Botanique ..... 0309
- Cellule ..... 0379
- Écologie ..... 0329
- Entomologie ..... 0353
- Génétique ..... 0369
- Limnologie ..... 0793
- Microbiologie ..... 0410
- Neurologie ..... 0317
- Océanographie ..... 0416
- Physiologie ..... 0433
- Radiation ..... 0821
- Science vétérinaire ..... 0778
- Zoologie ..... 0472

Biophysique
- Généralités ..... 0786
- Medicale ..... 0760

### SCIENCES DE LA TERRE
Biogéochimie ..... 0425
Géochimie ..... 0996
Géodésie ..... 0370
Géographie physique ..... 0368
Géologie ..... 0372
Géophysique ..... 0373
Hydrologie ..... 0388
Minéralogie ..... 0411
Océanographie physique ..... 0415
Paléobotanique ..... 0345
Paléoécologie ..... 0426
Paléontologie ..... 0418
Paléozoologie ..... 0985
Palynologie ..... 0427

### SCIENCES DE LA SANTÉ ET DE L'ENVIRONNEMENT
Économie domestique ..... 0386
Sciences de l'environnement ..... 0768
Sciences de la santé
- Généralités ..... 0566
- Administration des hôpitaux ..... 0769
- Alimentation et nutrition ..... 0570
- Audiologie ..... 0300
- Chimiothérapie ..... 0992
- Dentisterie ..... 0567
- Développement humain ..... 0758
- Enseignement ..... 0350
- Immunologie ..... 0982
- Loisirs ..... 0575
- Médecine du travail et thérapie ..... 0354
- Médecine et chirurgie ..... 0564
- Obstétrique et gynécologie ..... 0380
- Ophtalmologie ..... 0381
- Orthophonie ..... 0460
- Pathologie ..... 0571
- Pharmacie ..... 0572
- Pharmacologie ..... 0419
- Physiothérapie ..... 0382
- Radiologie ..... 0574
- Santé mentale ..... 0347
- Santé publique ..... 0573
- Soins infirmiers ..... 0569
- Toxicologie ..... 0383

### SCIENCES PHYSIQUES
#### Sciences Pures
Chimie
- Généralités ..... 0485
- Biochimie ..... 487
- Chimie agricole ..... 0749
- Chimie analytique ..... 0486
- Chimie minérale ..... 0488
- Chimie nucléaire ..... 0738
- Chimie organique ..... 0490
- Chimie pharmaceutique ..... 0491
- Physique ..... 0494
- PolymÇres ..... 0495
- Radiation ..... 0754

Mathématiques ..... 0405
Physique
- Généralités ..... 0605
- Acoustique ..... 0986
- Astronomie et astrophysique ..... 0606
- Electronique et électricité ..... 0607
- Fluides et plasma ..... 0759
- Météorologie ..... 0608
- Optique ..... 0752
- Particules (Physique nucléaire) ..... 0798
- Physique atomique ..... 0748
- Physique de l'état solide ..... 0611
- Physique moléculaire ..... 0609
- Physique nucléaire ..... 0610
- Radiation ..... 0756

Statistiques ..... 0463

#### Sciences Appliqués Et Technologie
Informatique ..... 0984
Ingénierie
- Généralités ..... 0537
- Agricole ..... 0539
- Automobile ..... 0540
- Biomédicale ..... 0541
- Chaleur et thermodynamique ..... 0348
- Conditionnement (Emballage) ..... 0549
- Génie aérospatial ..... 0538
- Génie chimique ..... 0542
- Génie civil ..... 0543
- Génie électronique et électrique ..... 0544
- Génie industriel ..... 0546
- Génie mécanique ..... 0548
- Génie nucléaire ..... 0552
- Ingénierie des systèmes ..... 0790
- Mécanique navale ..... 0547
- Métallurgie ..... 0743
- Science des matériaux ..... 0794
- Technique du pétrole ..... 0765
- Technique minière ..... 0551
- Techniques sanitaires et municipales ..... 0554
- Technologie hydraulique ..... 0545

Mécanique appliquée ..... 0346
Géotechnologie ..... 0428
Matières plastiques (Technologie) ..... 0795
Recherche opérationnelle ..... 0796
Textiles et tissus (Technologie) ..... 0794

### PSYCHOLOGIE
Généralités ..... 0621
Personnalité ..... 0625
Psychobiologie ..... 0349
Psychologie clinique ..... 0622
Psychologie du comportement ..... 0384
Psychologie du développement ..... 0620
Psychologie expérimentale ..... 0623
Psychologie industrielle ..... 0624
Psychologie physiologique ..... 0989
Psychologie sociale ..... 0451
Psychométrie ..... 0632

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The undersigned certify that they have read, and recommend to the Faculty of Graduate Studies for acceptance, a thesis entitled "Distributed Training in the Canadian Forces: A Decision-Model" submitted by Elizabeth A. Syvertsen-Bitten in partial fulfillment of the requirements for the degree of Master of Arts.

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## ABSTRACT

The purpose of this study was to produce a decision model to assist Canadian Forces trainers in determining if a particular training program is suited to a distributed approach to training. A version of the model was produced which presented factors for consideration derived from a review of the literature on distance education, distributed training and the Canadian Forces Individual Training System. Comments and suggestions were then elicited from four expert respondents by employing a modified Delphi technique. The collated comments, together with proposed modifications to the model based selectively on those comments, were returned to the respondents for their assessment. All respondents indicated their satisfaction with the proposed modifications. The model was then modified as proposed.

## ACKNOWLEDGEMENT

I am grateful to Dr. Bruce Clark for the guidance and support he so generously provided in the preparation of this thesis.

## DEDICATION

This thesis is dedicated to Mike and Davey.

## TABLE OF CONTENTS

## LIST OF TABLES

## LIST OF FIGURES

# CHAPTER ONE

# INTRODUCTION

## Background

Faced with ever decreasing resources for training, it seems unlikely that the Canadian Forces (CF) will be able to meet increasing demands for highly skilled people by means of an unquestioning application of traditional training methods. The CF has not been reluctant to take innovative measures designed to meet the heavy demand for trained people. The most important innovation so far has been the introduction in the late 1960s of the Canadian Forces Individual Training System (CFITS). The CFITS is characterized by three key principles--performance orientation, maximum efficiency and the systems approach; and it employs five processes--analysis, design, conduct, evaluation and validation. Since its introduction, policy has dictated that all individual training in the CF shall be developed and conducted in accordance with CFITS principles and processes.

Despite the adoption of the CFITS, and other innovative measures, the cost of training in the CF remains high. One reason for this is that formal training is conducted almost entirely at central schools which may be located thousands of miles from a trainee's home base. Thus, the cost of travel, accommodation and additional time off the job must be added to the cost of implementing the CFITS. Also, because of scheduling and loading limitations, trainees may not receive training when they need it most. Some may receive it before and some after they are required to put it to use. Indeed, some schools are swamped by the demand to provide required training, and this results in

unacceptably long waiting lists. The cost of concentrating training at central schools together with the inability of some schools to provide "just-in-time" training tend to cancel out much of the saving derived from taking advantage of advances in training technology and methodology.

It is understandable, then, that CF trainers are now looking for ways to alleviate some of the expenses and limitations associated with conducting training at centralised schools. An obvious alternative to the traditional centralized approach would be to distribute training so as to make it available to people at their home units.

Distributed training, also known as remote or non-resident training, is still in its infancy in terms both of the extent to which it is put to use in military organizations and of the amount of literature that exists on its selection, design, development and implementation. It is attracting attention as an alternative to formally presented class-room instruction, though, because its potential benefits seem clear, especially in view of the rapid advances in technology including delivery systems and media which seem to make it a more attractive and feasible option.

Should it be decided to employ distributed training as one means of preparing CF people for their jobs, it would presumably be introduced gradually and only for carefully selected programs judged to be suited to such an approach. Unfortunately, there is currently little help available to those who would have to decide if a program is suitable for distributed training. As currently constituted, the CF's Manual of Individual Training (comprising nineteen volumes referred to informally as the 9000 series) does not specifically address distributed training issues; the series offers no guidance on selection

or on how, when and where distributed training would be applied as an integral part of the CFITS. Such guidance would have to be developed and made available.

**Purpose**

The purpose of this thesis is to develop a basic decision model to assist CF trainers in making informed decisions regarding the selection of the distributed approach to training. The model--primarily algorithmic in nature--will guide them through the training development issues that should be considered in deciding whether or not to select distributed training for any particular program or to solve any particular training problem. Although the model may not always lead its users to clear-cut "go - no go" decision points, it will enable them to make carefully considered and well-informed decisions. The study will contribute to the body of knowledge on the development, design and implementation of distributed training in a military setting. Canadian, British and United States militaries are among those becoming involved in distributed training but none have actually incorporated it into their particular training systems.

The study will also contribute to the body of knowledge related to Distance Education. According to Schieman, Teare and McLaren (1992) little has been written on the design and development of Distance Education. Interestingly, Coldeway (1987) says that in developing Distance Education trainers would be wise to take a systems approach to training. The CFITS relies for its success on adherence to the processes involved in the systems approach to training; therefore, it may well prove to be a fertile and illuminating proving ground in the development of distributed training and, by extension,

distance education.

From a more practical standpoint CF trainers, and especially training development officers (TDOs), who are required to provide advice and assistance in support of training, will be made aware of what distributed training entails. In accordance with their mandate and responsibilities TDOs will have to become knowledgeable in that approach. Their advice and assistance will be crucial, and never moreso than when the decision is being made as to whether or not distributed training is the most appropriate approach to solving a particular training problem.

**Limitations**

It is either beyond the scope or not the aim of this thesis to:

a. persuade CF trainers to adopt a distributed approach to training. (It appears that they will be considering such an approach without prompting from this thesis. This thesis will provide the information required to allow them to make informed decisions related to the selection and implementation of distributed training).

b. provide a model or an algorithm which will in every instance lead trainers to a clear-cut "go-no go" decision as to whether or not to adopt a distributed training approach. (In some instances trainers will have to make a decision based on less than conclusive data or on factors external to the model).

c. provide a detailed cost-analysis model related to the introduction and development of distributed training.

d. campaign for more thorough implementation of the CFITS and more rigorous

adherence to its principles and processes (although it will be demonstrated in Chapter 2 that such increased thoroughness and rigour would facilitate the introduction and implementation of a distributed approach to training).

**Assumptions**

In preparing this thesis and designing the decision model it is assumed that:

a. The highest priority for CF trainers and TDOs is to attain operational effectiveness through efficient and effective training; and

b. CF trainers and TDOs who use the model will be knowledgeable in the CFITS and will have access to the 9000 series.

**Summary**

The pressure on CF trainers to provide highly trained people at minimum cost is intense and unremitting. Distributed Training is seen as a promising alternative to formal training conducted at centrally located schools. The distributed approach to training would be selected only for courses deemed to be suited to such an approach. There is at present, however, little guidance available to CF trainers on the selection and implementation of distributed training. The purpose of the thesis is to provide such guidance by presenting and examining factors that should be considered in determining if distributed training is appropriate. The product of that examination takes the form of a decision model. The model is designed to take into account the requirement for a distributed approach to adhere to the principles and processes of the CFITS. The

preparation of the thesis itself also reflects that requirement. It draws, therefore, upon two main sources of information: the literature on the CFITS (Chapter 2); and the literature on Distance Education and Distributed Training (Chapter 3).

# CHAPTER TWO

# THE CANADIAN FORCES INDIVIDUAL TRAINING SYSTEM (CFITS)

## Introduction

This chapter will describe the CFITS, review the events leading to its introduction in the late 1960s, and examine the way in which it has been implemented. CF trainers responsible for determining the feasibility of a distributed approach to training must examine factors unique to that approach, but they also require a sound working knowledge of the CFITS. Distributed training must be implemented in a manner consistent with the principles and processes of the CFITS; therefore, those principles and processes must be known and understood. As well, reviewing the history of the CFITS yields insights and information invaluable to anyone assessing the appropriateness of a distributed approach. Finally, many of the factors that have contributed to the successful, or sometimes less than successful, implementation of the CFITS may well contribute to the success or failure of a distributed approach to training.

## History

***Early CF Training*** Until the mid 1960s CF trainers were able to devote virtually all their energy to ensuring the quality and comprehensiveness of training with little concern for its cost. As a result, and as people nostalgic for what they regard as "the good old days" like to point out, Canada's soldiers, sailors and airmen seemed well enough prepared to do their jobs back then; so why did we not leave well enough alone?

The answer is simple: we could not afford to train people today the way we did

then. Even a cursory examination of training as it was conducted in those days reveals that it would be prohibitively expensive and wasteful to conduct it that way in today's economy.

What made training in those days so expensive?

First, their determination to provide high quality training led CF trainers to emulate the approach traditionally taken by educators, so that they concentrated heavily on the theoretical aspects of the job to be performed by graduates while paying little attention to its practical requirements. It was assumed that, somehow, theory would be smoothly translated into on-job performance. Today that assumption is not so readily accepted. The heavy concentration on theory resulted in long and expensive courses. People being prepared for the more technical jobs could expect to be on course for a year or more during which time they were a costly burden rather than a benefit to the service. To make matters worse much of the theory to which they were subjected was irrelevant to the actual duties and tasks they would be required to perform on the job, and no training is as expensive and wasteful as training that is not necessary in the first place no matter how well it is prepared and presented.

Evaluation of trainees also followed the traditional approach favoured by educators in that it was almost always norm rather than criterion-referenced. All too often this approach resulted in artificially high failure rates, sometimes as high as sixty-five percent. Training managers accepted such failure rates willingly, in part because they appeared to protect the integrity and enhance the prestige of the training. What did not seem to occur to them, however, was that great numbers of trainees were failing tests that did not fairly

reflect the instruction they had received, let alone the job they were being prepared to perform. The fact that trainees often failed after being on course for many months was a major contributor to the waste inherent in the approach that some recall with such affection.

People who managed to graduate from heavily theory-oriented courses and who proceeded to the "field" to put their training to use on the job still faced the prospect of periodic, theory-oriented, written examinations which they had to pass before they were considered fully qualified and eligible for promotion. Those examinations, or "trade boards", survived for many years until policy makers finally began to question the apparent contradiction that arose when people who could perform on the job to everyone's satisfaction were unable to pass their "trade boards" (conversely, there were some who performed well on examinations but could not perform satisfactorily on the job). Like their civilian and military counterparts in the United States, Canadian military trainers began to focus less on the learning process itself and more on job performance. They questioned the assumption that theory could readily be translated into job performance and began to move towards the kind of instruction that would much more precisely match training to job requirements. They began to accept the notion that military training should be performance-oriented.

***Performance Oriented Training*** In 1962 the National Society for Programmed Instruction (NSPI) was founded in San Antonio, Texas, by a group of educational researchers to facilitate learning by systematically designing a sequence of events to meet

specified behavioral objectives. Throughout the sixties, however, the Society's goals expanded:

> Gradually the enquiry, analysis, research and development tools in use became more precise. Members confronting a range of performance problems recognized many which did not yield to "instructional" solutions. Reflecting these broadened concerns, the Society became the National Society for Performance and Instruction in 1973. As such, NSPI is committed to a process, that of analysis, tryout and data-based revision for developing solutions to human performance problems . . . (NSPI, 1986, cover).

That name-change symbolized the way in which "improving human performance" rather than "improving learning" gradually came to be the goal of trainers in the sixties.

In the United States the early experience of Harless (1988), although not pivotal or even necessarily influential in terms of military training, is also indicative of the shift in focus in the 1960s from learning to performance. After graduating as a "cognitive" psychologist, he and others with similar training set about plying their trade. Their goal was to improve instruction and therefore to improve learning. They found themselves in the midst of what Harless recalls as "one of those periodic educational revolutions". That particular "revolution" featured growing numbers of consultants as well as teaching machines, programmed texts and other innovations. There did not, however, seem to be a reliable method of checking to ensure that learning had occurred as a result of instruction. By controlling variables associated with the learning process and by administering pre- and post-tests Harless and his colleagues were able to demonstrate to clients such as AT&T that learning did in fact occur as a result of the improved instruction they provided. They could guarantee learning. At that point Harless recalls they could have left well enough alone, but they wondered what effect their instruction

was having on graduates. Did they accomplish more or perform better as a result of instruction? Harless and his colleagues conducted follow-up investigations and found that there was either no change or not enough change. This was a disappointing finding as they had assumed that improved learning would result in improved performance, and it apparently did not necessarily do so. Subsequent investigation led them to conclude that there were several reasons for the inadequate transfer from instruction and learning to performance: (1) students may not have been ready to use their newly acquired knowledge and skills (and without the opportunity to use them they were soon forgotten); (2) there was no need for the training they received; (3) the organization did not value their new skills; and (4) the conditions under which they had to perform on the job were very different from those under which learning had taken place. In general it was found that it is ineffective to teach people what they should know as opposed to what they must do on the job. Harless's findings and conclusions, typical of those arrived at in civilian and military circles in the 1960s, are now accepted as assumptions by military trainers. They are among those that support and justify the concept of performance-oriented training which, along with maximum efficiency and the systems approach, is one of the key principles on which the CFITS is based.

Another development--central to the introduction and implementation of performance-oriented training and of training systems--occurred with the notion of stating instructional objectives in terms of student performance. The idea of stating instructional goals in formal statements that clearly describe what the students should be capable of doing upon completion of instruction evolved from three main instructional movements.

The earliest was that of Tyler (1964), who advocated the specification of goals of instruction in terms that would be meaningful and useful to the classroom teacher. The second was that of Miller (1962), who responded to the need for people to operate and maintain large complex military weapons systems by pioneering procedures for analyzing job tasks and stating them as objectives. The third was that of Robert F. Mager. Although programmers had for some time been insisting that the first step in preparing programmed instruction must be the formulation of behaviourally stated instructional objectives, it was not until publication of Mager's books on preparing objectives (Mager, 1961, 1962) that widespread interest in them was aroused. Mager maintained that to succeed in communicating the writer's intent the objective should: (1) describe what learners must *do* to demonstrate that they have achieved the objective; (2) describe the important conditions under which the learners must demonstrate their competence; and (3) state the standards of performance expected of the learners. All training in the CF is based on objectives prepared in the three-part format that Mager advocates. Indeed the CF, moreso than other military organizations, uses objectives to link training directly to job performance. Whereas other organizations use training objectives to describe what trainees must be able to achieve at the school on completion of their training, the CF uses performance objectives to describe what graduates will be required to perform on the job. Training is consciously directed towards real world rather than training tasks. A distributed approach to training in the CF would also employ such performance objectives.

***Maximum Efficiency*** The principle of maximum efficiency is a function of both the quantity control and the quality control aspects of the CFITS :

> Training is generally the most costly solution to a performance deficiency. It demands an extensive outlay of resources for both development and implementation: analysts, developers, instructors, supervisory and management staffs, training equipment and facilities, support staffs and facilities, consumables, travel time and funds. Therefore, the decision whether to train or not to train, how to train, whom to train, and when to train, must be made only after due consideration is given to the performance payback that training offers relative to the investment required to implement and maintain it, i.e., can it be done cost-effectively? The concept of maximum efficiency requires that performance objectives, training strategies, resource expenditures and number of personnel requiring training be strictly controlled to provide training that satisfies operational needs at the minimum acceptable cost. (DND, NDHQ, 1989, p. 5)

It is ironic that operational personnel in the CF are much quicker to opt for formal training as the solution to performance deficiencies than are training specialists who try to find other less expensive solutions or at least to limit training to that which is essential to address a deficiency.

***The Systems Approach*** The systems concept has its origins in the fields of military management and technology. Significant events such as the Soviets beating the Americans into space with Sputnik I in 1957, and less dramatic events like contractors' unsatisfactory performance in designing and delivering weapons systems for the military, hastened the application of systems engineering for military purposes (although as Romiszowski (1981) points out, the general approach is as old as the scientific method itself and has been practised by a few enlightened souls for generations). A "system" is essentially a collection of interdependent and interrelated parts working together to achieve a specified

goal or objective and maintained in a steady state by feedback from the environment. Key words in that definition are: *interdependent* and *interrelated,* which establish that each component of a system is influenced by the other components and is essential to the attainment of an identified *goal* or *objective*; and *feedback,* which suggests that data from both inside and outside of the system are employed to evaluate and validate the system.

A basic example of a system in a military setting is a soldier with a gun. This combination conforms to the definition offered above. Any system is also part of a larger system, so that the man with a gun would be part of a squad, squads are combined into platoons, and on up the hierarchy of military formations.

There are, obviously, more complex weapons systems. In the early 1950s the term "Weapons Systems Concept" became fashionable. A weapons system was considered to be a complete set of armaments, delivery vehicles, navigational equipment, launch services, test equipment, training aids, and servicing and maintenance procedures, designed as a complete entity to carry out a defined military mission at some total cost. The contractor under this new concept was to be given responsibility for building not only an aircraft, or a tank, or a ship, but for the total system required to fulfil the mission specifications.

The systems concept featured total and continuous planning throughout the life of a program. This included the definition of the system, its development, production, operation, maintenance and training. The systems concept transformed the nature of the task, which now became a real world project rather than the solving of some isolated problem or the building of some individual piece of equipment. Whereas, previously, the

people responsible for solving the overall problem were separated from the designers of the equipment, they now became part of the design team. "Systems engineers" became the term to describe those engineers responsible for the efficiency of the total system. In the development of, for example, a weapons system, the systems engineer began with an operational requirement--a precise statement of the objectives to be achieved by the system. The systems designer then worked backwards from these objectives to produce an arrangement of sub-systems which, when operated in accordance with some operational plan, fulfilled the objectives. The process ended with a series of tests to ensure that the design achieved did in fact fulfill the requirements. By this time a plan had also been worked out to ensure that people who were tasked to operate the system would receive the training they needed. The CF followed the lead of the United States military in adopting a systems approach to capital acquisitions, but not before they had learned the same lessons that the Americans had learned: that it is painful to find out, as a new piece of equipment is delivered, that the requirement to train people to operate and maintain it has not been taken into account and budgeted for. The term "systems approach" can be redefined as it applies to training as the application of a logical, interactive series of steps between the identification of jobs, duties and tasks and the provision of trained people to perform them. A training system can be designed in substantially the same way as the weapons system described above. The performance which someone must exhibit on the job becomes the objective which must be achieved by the training system. The training system's designer then has the task of selecting and sequencing a series of learning experiences which will allow trainees to perform as specified.

By the mid 1960s the CF had become disenchanted with what they had come to see as their costly, discipline-based, hit-or-miss approach to training. They decided to adopt an approach that would precisely match training to the job. They developed a systems approach to training (SAT) model which would eventually comprise the quality control sub-system of the CFITS. The CF model was similar in concept to the Instructional Systems Development (ISD) model already being employed by the United States armed forces and to the SAT model employed by the (British) Royal Air Force.

**Description**

The CFITS is intended to provide a structure for the management of training, to ensure an orderly approach to the goal of relating training to the jobs CF people will have to do, and to provide people trained to maximum efficiency at minimum cost. It is, as we have seen, characterized by three basic concepts or principles: performance orientation, maximum efficiency and the systems approach. By employing the CFITS the CF's goal is "to produce . . . the right number of people, with the right qualifications, at the right time and at minimum cost" (DND, NDHQ, 1989, p. 3). The CFITS includes an extensive infrastructure to ensure that schools' administrative, financial and logistical requirements are addressed, and to manage and control all individual training carried out by the CF. This includes the quantity control sub-system of the CFITS, the aim of which is to ensure that the appropriate number of trainees are made available and fed into the system so that (a) the system is neither overloaded nor under-utilized, and that (b) operational requirements for appropriately trained people continue to be satisfied in a timely fashion.

Quantity control is crucial to the efficiency and effectiveness of the CFITS; however, it is primarily an administrative function and needs no further elaboration here. The heart of the CFITS from a training development standpoint is the quality control sub-system. It is in controlling the quality of training that the systems approach comes to the fore.

The quality control sub-system of the CFITS consists of five components or phases--analysis, design, conduct, evaluation and validation--which are dependent on and interrelated to each other. The sub-system is customarily represented graphically as a closed loop to illustrate the interdependence and interrelationship of the components and to show that feedback is available from all sources both internal and external to the system (see Figure 1).

In the *Analysis* phase, military occupations are analyzed. Data from these analyses are used to produce specifications which describe the jobs, duties and tasks that military people will have to perform at various qualification levels throughout their careers. The specifications are then analyzed to identify tasks for which training is required. Those tasks are written as performance objectives, and are included in a control document called a Training Standard (TS), along with other information and direction intended to control, limit and constrain the design, development and conduct of training.

In the *Design* phase, the POs contained in the TS are analyzed and broken down into manageable "chunks" or Enabling Objectives (EOs). EOs are included in a Training Plan (TP). In this document the EOs are also sequenced for instruction, and the appropriate instructional methodology and materials are identified.

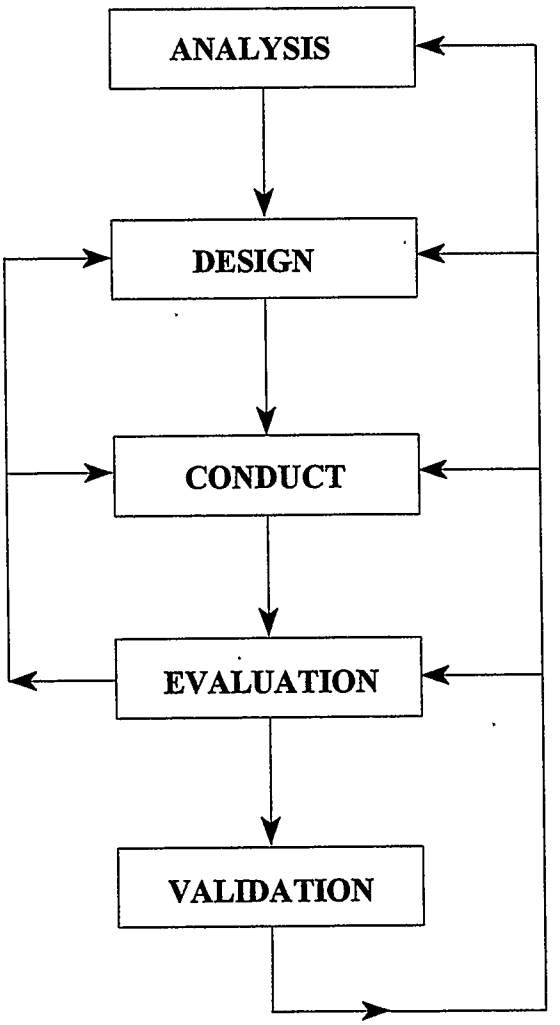


Figure 1. The CFITS

In the *Conduct* phase, the course is conducted according to the TP so as to enable the trainees to achieve the objectives contained in the TS. Trainees' achievement of POs and EOs is checked as the course progresses.

In the *Evaluation* phase it is determined how efficiently the implementation of the TP brought about the desired outcomes detailed in the TS. If discrepancies or problems are noted, the instruction and/or the TP are amended as necessary.

Approximately six months after trainees have completed their training and gone to their jobs, *Validation* is carried out. Data from the validation study are analyzed and fed back into the system along with recommendations for corrective action, thus closing the loop.

The foregoing description of the quality control aspect of the CFITS suggests that training consists only of formal courses. In fact, a considerable amount of training is carried out on the job, primarily because equipment and practice cannot always be provided at a school. (It is also recognized that leaving people on formal courses too long delays their posting to the operational arena and gainful employment; however, sending them to the "field" too soon places a training load on already hard-pressed operational people. Care must therefore be taken to strike a reasonable balance between the two types of training). To that extent there has always been a form of distributed training designed into the CFITS, although little thought has ever been devoted to its design, conduct or support requirements. Presumably, significant involvement in distributed training could result in re-evaluation of the way in which training is split between formal course and on-job-training. (A recent CF policy change has brought an end to the separation of formal

course and on-job training program; the two are now combined into a single training program).

**Implementation**

CF trainers are given no choice as to whether or not to apply the CFITS and, by inclusion, the SAT. Official policy, as stated in an administrative order known as CFAO 9-47, directs that: "All individual training shall be planned and conducted in accordance with the CF Individual Training System (CFITS) . . . " (DND, NDHQ, 1988, p.1). Since its introduction, however, it has never been possible to implement the CFITS in an entirely satisfactory fashion, and as a result it has failed to realize its full potential in meeting the CF's need for cost-effective training. As early as 1974, a high level committee concluded that: "The [CFITS] has not achieved its potential, although its basic principles are sound . . . [R]ealistic training . . . requires specialised staff to determine, organize, implement, and control training programs." (DND, NDHQ, 1974, p.14). A concept paper prepared in 1979 reported similar findings (DND, CFTSHQ, 1979), as did a major study conducted in 1982 (DND, NDHQ, 1982).

In fairness to the system, one feels obliged to respond to the accusation that the CFITS has not done well by asking "compared to what?" Certainly no one who has studied the system, formally or informally, has suggested that the CF should return to a traditional, discipline-based and predominantly theory-oriented approach. Rather, there is a sense that the SAT model employed by the CFITS appears so logical and reasonable--even simple--in concept that it should be more successful than it has been in achieving

its aim.

The remainder of this chapter is devoted to an examination of some of the factors which are considered to have contributed to the sometimes less than satisfactory implementation of the CFITS. (Measures that have been taken to resolve problems will also be briefly described). The relevance of such an examination to this thesis lies in the fact that many of the factors critical to the success of the CFITS would also be critical to the success of a distributed approach to training in the CF.

The simplicity of the quality control sub-system of the CFITS resides in the fact that by adopting it CF trainers are undertaking only to find out what people are required to do on the job, design and conduct training that will allow them to do that, and check periodically to make sure that the training provided continues to be efficient and effective. The logic of the system is obvious. What is less obvious is that it requires the application of specific expertise at each stage of its implementation if it is to achieve the efficiency, effectiveness and economy of which it is capable. A great deal of harm to the system can be caused by assuming that it is a simple matter to produce the documentation, instructional materials, and support required to make it work. The system will break down if not enough people or if untrained people are made available to analyze, design, conduct, evaluate and/or validate training. Those functions must, at the very least, be guided and supported by specialists. One of the biggest mistakes that was made when the system was introduced was to proclaim that it could be implemented by people with no specialist knowledge of the system and to fail to recognize the need for specialist support. More than ten years went by before this mistake was rectified by providing specific

training for non-specialists to cover the implementation of each individual phase of the system, by providing specialist training development officers (TDOs) to support and drive the overall system, and by establishing the Training Development Centre as a supporting centre of expertise. Similarly, and as the decision model that is a product of this thesis takes into account, a distributed approach to CF training could not succeed unless appropriate numbers of trained people, supported by specialists, were made available.

Time has always been another resource in short supply in the implementation of the system. The work that has to be done early in the system--at the "front end"--is difficult and time consuming. Analysis and design must be carried out thoroughly before any instruction takes place and it is difficult to convince senior managers that these essential activities can take many months to complete. At the other end of the loop, validation is also difficult and time consuming to carry out and there has always been a tendency to neglect or omit it if training seems to be running smoothly. Yet, like any other system, the CFITS will break down if one or more of its components is omitted or neglected. All too often training managers, who presumably would not for a moment consider using a stereo system without speakers or an amplifier, have applied the training system without using all its components. Since its introduction, then, the system has too often been applied piecemeal and without benefit of sufficient numbers of trained operators and specialists. Even so, when the system falls short of achieving its aim of maintaining and improving the quality of training, the tendency has been to attach blame not to shortcomings in the implementation of the system but rather to the system itself. Yet the system has been durable enough to survive despite suffering lack of support and

harsh criticism. Other innovations have not survived. Innovations such as teaching machines, programmed texts and various attempts at paper-based or computer-assisted individualised instruction have failed and been discarded, more often than not because of inadequacies in their implementation rather than in the innovations themselves. The message for distributed training is clear: any attempt to implement a distributed approach to training without adequate resources or support, or without adhering to CFITS principles and processes, could result not only in the failure of that approach in a particular training situation but could help to destroy the credibility of Distributed Training in general in the minds of CF policy makers and training managers.

It must also be noted that, historically, no sustained effort was ever made to foster and "sell" the CFITS so that it might stand a reasonable chance of winning the wholehearted support of those commanders and their staffs responsible for training. (The United States armed forces refer to this activity as "marketing" and they practise it vigorously). It is better known now than it was in the early days of the system that no matter how inspired an innovation may be, it will be unsuccessful unless careful planning and concerted efforts are put into getting it accepted, adopted and implemented. Part of the TDOs' mandate is to help redress the balance between producing the CFITS on the one hand and implementing it on the other. To this end TDOs' own training places heavy emphasis on innovation and change agentry to prepare them to work towards thorough and whole-hearted acceptance and implementation of the system. They will also need to put these skills to good use in promoting the concept of distributed training and, as the decision model suggests, in convincing reluctant training managers that it is a feasible and

desirable alternative to formal instruction conducted in a central school.

Finally, it must be noted that the command and control infrastructure of the CFITS itself causes problems when it comes to implementing the SAT. From a management point of view, having that infrastructure in place and operating as it does is justified. In controlling the quality and quantity of training, the system demands and is set up to ensure that decisions based on the right data are made by the right people at the right time. To this end the infrastructure results in decisions regarding quality control being made at three levels. At the highest level, National Defence Headquarters (NDHQ) decides the duties and tasks which will comprise people's jobs and produces occupational specifications. At the next level, appropriate Command Headquarters analyze the specifications to decide which tasks require training, and produce training standards. (The three main Commands are essentially navy, army and air force, with communications training and training common to all Commands being the responsibility of other headquarters). Commands are also required to validate the training for which they are responsible. At the lowest level of control, schools are left to design, conduct and evaluate training. Again, this three-level organization is justified on the grounds that crucial decisions regarding training must be made at the appropriate level. For example, it would be inappropriate and undesirable to allow a school to decide what a soldier, sailor or airman is required to do on the job; and it would be wasteful and inefficient for NDHQ to get involved in the design or conduct of training. Although the three-level organization can be justified from a management point of view, however, it must be said that it is cumbersome and inhibiting when it comes to implementing the quality control

sub-system. With different people working on different parts of the sub-system there are, inevitably, disconnects between the phases as, for example, when Standards writers at Commands must interpret the specifications produced by people at NDHQ, and designers at schools must interpret the standards set by Command people. This problem is compounded by differences among the three levels in available resources, as well as in commitment to, or faith in the workability of, the system. Also, responsibilities at each level tend to be jealously guarded. For example, schools have been known to be reluctant to reveal their training plans or the results of their evaluation of instructors or instruction to higher authorities on the grounds that they are internal matters and no-one else's concern. Any attempt to introduce distributed training must recognize and deal with the strengths and weaknesses and idiosyncracies of the three-level command and control mechanism employed by the CFITS.

**Summary**

This chapter examined factors related to the CFITS that CF trainers should consider in determining the feasibility of selecting a distributed approach to training. Policy dictates that all individual training in the CF be developed and conducted in accordance with the CFITS. The CFITS is characterized by three key concepts--performance orientation, maximum efficiency and the systems approach--and it employs five processes--analysis, design, conduct, evaluation and validation. Should a distributed approach to training be implemented, it must adhere to those principles and processes. CF trainers should also be aware of some of the problems that have been encountered in

implementing the CFITS. Although it is sound in principle, it has sometimes failed to realize its full potential, in part because of a lack of adequate resources and support, a failure to foster or "sell" the system, and a cumbersome system infrastructure. The hazards of proceeding with a distributed approach to training without ensuring the availability of adequate resources and support, without "marketing" the approach, or without adhering to CFITS principles and processes were noted.

# CHAPTER THREE

# A REVIEW OF SELECTED LITERATURE ON DISTANCE EDUCATION AND DISTRIBUTED TRAINING

## Introduction

Although the literature on distributed training is expanding rapidly, it still provides only limited insight into how or why a particular training program is selected for distribution. Little guidance is provided for trainers seeking to understand the issues that must be considered in selecting the distributed approach and in selecting a medium with which to deliver training at a distance. Trainers must turn to the literature on distance education for much of their direction and guidance.

Is the study of the literature on distance education likely to throw much light on the selection criteria for distributed training? Distributed training in a military setting must be implemented by adhering to such systems concepts as task analysis, behavioural objectives and criterion-referenced instruction and testing whereas, in general, it is safe to say that distance education has not generally been so implemented in an educational setting. Thus it might appear as though trainers have little to learn from the literature on distance education. An examination of that literature, however, reveals widespread enthusiasm and advocacy for a systems approach to implementing distance education. It is clear, then, that military trainers, committed as they are to the systems approach, will indeed find much of value in reviewing the literature on distance education (if not the way in which it is implemented) when considering the feasibility and desirability of introducing

a distributed approach to training.

**Defining Distance Education and Distributed Training**

Garrison and Shale (1987) suggest that the distinguishing feature of distance education is that it is a means of extending access to education to those who might otherwise be excluded from the educational experience. In this context, they argue that there are three essential criteria that characterize the distance education process:

1. Distance education implies that the majority of educational communication between (among) teacher and student(s) occurs noncontiguously.
2. Distance education must involve two-way communication between (among) teacher and student(s) for the purpose of facilitating and supporting the educational process.
3. Distance education uses technology to mediate the necessary two-way communication. (p. 11)

The United Kingdom (UK) Delegation of the Euro NATO Training Working Group on Training Technology (1991) defines distributed training as ". . . training capable of delivery independent of location and time, but still designed to achieve standardised learning outcomes. It may be provided with, or without, access or organised support and may be delivered by a local teacher or supervisor" (p.1).

The United States Army Training and Doctrine Command (TRADOC) (1989) define distributed training as:

> . . . a methodology which packages instruction so that it may be made available to troops and units in geographically dispersed locations where and when it is needed. There are two main methods employed to deliver the training, namely electronic or mail delivery. The instruction delivered in either manner tends to be student-centered since much of the burden for learning is placed on the student . . . . The goal of Distributed Training is to assist the Army in meeting its training requirement by bringing standardized, quality, cost-effective training to the soldier at a time and

> place most convenient to him and his unit through the systematic implementation of existing and emerging technologies. (p. 1)

**Defining the Need for Distance Education/Distributed Training**

In the Canadian Forces (1991) distributed training is viewed as a possible solution to a multi-faceted problem:

> In today's times of constraint and force reduction there is a need to make the Canadian Forces Individual Training System (CFITS) more economical and efficient. Individual training must become more available to all within the Total Force. Training must be designed to meet changing operational requirements and delivered at a time and place convenient to the operational commanders. Training managers must determine how to reduce training resources without sacrificing training effectiveness. (p. 1/20)

Simpson (1990) provides a very clear description of the problem facing the U.S. Navy to which distributed training is viewed as a solution:

> The Navy training community currently lacks the capability to bridge geographic barriers in training delivery. This fact impacts on training in many ways. Perhaps the most common impact is that training solely dependent on local resources often does not occur. If the prospective student is at sea, and cannot be spared to attend a resident school, then that sailor does not receive training. There are costs even if the student can be sent to school such as the monetary costs of travel and per diem, and the physical loss from the job of the person attending training. Moreover, because temporary training assignments may end with the newly-trained sailor going to another duty station, there are practical disincentives to release personnel for school. (p. 14)

Phelps, Ashworth and Hahn (1991) provide an excellent description of the situation for US Army Reserve personnel (which, on a smaller scale, is true of the Canadian Forces Reserve Component).

> Geographical dispersion, limited resources and civilian job and family demands make travel to distant locations for training and education difficult for members of the Reserve Components (RC). The Army RC, composed of the United States Army Reserve (USAR) and the Army

> National Guard (ARNG), consists of approximately 7,000 units scattered the nation and overseas at more than 4,000 armories and reserve centers. (p.1)

Hahn, Harbour, Wells, Schurman and Daveline (1990) describe the potential solution as follows:

> An ideal training option for the RC would be one that minimizes cost and maximizes quality, throughput, and availability. High quality training that could be delivered at the soldier's home or home armory/reserve center should provide good throughput and acceptance, so would meet this ideal if it were of low cost. (p. A2)

Recognising that resources such as training time, money, land, and equipment are dwindling, the US Army is relying on distributed training technologies to deliver cost-effective training. The Army's objective is to reduce total resident training time by 14 percent by the year 2007 (TRADOC, October, 1989). The Army considers the following benefits will be gained from distributed training: enhancement of training economies through standardization, course design, and delivery; provision of more timely and effective Reserve Component training; reduction in travel; and, maximum use of existing and emerging technologies.

**The Importance of Getting People "On Side"**

Kearsley (1985) identifies the support of field managers and supervisors as critical to the success of distributed training program. He suggests ways in which managers and supervisors can be brought on-side: "(1) Make support of distributed training and coaching employees a job responsibility; (2) provide incentives for getting employees through distributed training as quickly as possible; and (3) require them to schedule a

certain percentage of employee time for training" (p. 36). In addition, he says, "it is important that field managers and supervisors be well-informed about the nature and goals of a distributed training program; orientation programs about training therefore are very important" (p. 37).

The US Army recognises the need to promote the distributed approach to training. It has developed a detailed marketing plan, identifying specific activities to be carried out by proponent schools. (TRADOC, 1992)

**The Systems Approach and Distance Education/Distributed Training**

The use of the systems approach in distance education has considerable support. Kaye (1981a) proposes a systems model of distance education based on the organizational concepts proposed by Miller and Rice (1967), who see organizations as open systems which exist by exchanging materials with their environment. According to Murgatroyd and Woudstra (1989), the strength of the model proposed by Kaye is that it deals with the question of quality. Through systems analysis of the course or program development process quality problems are eliminated over time by systematic feedback and self-regulatory mechanisms. Coldeway (1987) and Garrison (1989) suggest that distance education could benefit by employing a systems approach known as ISD (Instructional Systems Design). ISD, a behavioural approach to instruction, is employed by the US military. ISD, like the CFITS, consists of five phases: Analysis; Design; Development; Implementation; and, Evaluation.

Citing one of his previous articles Wedemeyer (1979) proposes eleven criteria

which he derived from institutional models for constructing a distance education system. The following criteria are, for the most part, pertinent to both distance education and distributed training:

1. The system must be capable of eliciting, interpreting and analyzing learner goals at the entry point and throughout the student's contact with the instructional and learning program.

2. The system must require formulation of learning objectives in such a way that they can serve as the basis for decisions in instructional design, including evaluation, and in such a way that they will not only be fully known to the students, but so that the students can participate in decision-making.

3. The system must be capable of enabling learners to participate in the program of learning and instruction without imposing traditional academic entry requirements, without the pursuit of an academic degree or other certification as the exclusive reward.

4. As an operating principle, the system must be capable, after reaching a critical minimum of aggregation, of accommodating increased numbers of learners without a commensurate increase in the unit cost of the basic learning experiences: i.e., costs must not be directly and rigidly volume sensitive. After reaching the necessary level of aggregation, unit costs should show a diminishing relationship to total systems costs.

5. The system should make it operationally possible for the methodologies of instruction and learning to employ sound, television, film, and print as options for mediating learning experiences and as means of communication.

6. The system should use testing and evaluation principally to diagnose and analyze the accomplishment of specified learning objectives, including the objective of self-directed rather than other-directed learning.

7. The system must be able to tolerate distance between the instructional staff resources and the learner, and employ the distance factor as a positive element in the development of independence in learning.

8. The system must accept the learner and his surround as the environment for learning, and must concentrate on enriching that environment instead of concentrating solely on developing specialized teaching environments

which intrude barriers of place, space, time and other-direction in learning.

9. The system will employ community and regional resources in rooting learning in the everyday environment of living, working and developing.

10. The system must acknowledge that it embodies two separate but related programs - the instructional program carried on by the system and reflecting the needs and aspirations of learners working towards mutually agreed upon goals; and the learning program carried on by learners with the assistance of the system.

11. Subsystems for instruction, learning, communications, materials development and maintenance must be designed as integral parts of the instruction. (p. 12)

USCG (1993), TRADOC (1992), ASTS (1992) and CF (1991) emphasize that the application of the principles of the SAT are not only required for military training but that they are essential for good course design. Hahn et al (1990) indicate that adherence to the principles of the SAT was critical to their work in developing the computer-mediated distributed training system known as SMART (System for Managing Asynchronous Remote Training).

**Deciding To Use The Distributed Approach - Selection Criteria**

Most of the literature available on distributed training comes from the American military and it is for the most part descriptive and technology specific. Simpson (1990); Simpson and Pugh (1990); Simpson, Pugh and Parchman (1990); Simpson, Pugh and Parchman (1991); Pugh, Parchman and Simpson (1991); Maloy and Perry (1992) and Simpson (1993) present the results of extensive research into a distributed approach to training for the U.S. Navy using video teletraining. Harbour et al (1990); Hahn et al

(1990); Hahn et al (1991) and Phelps et al (1991) describe how computer-mediated communication (CMC) (primarily asynchronous computer conferencing) can be used to meet the educational requirements of the U.S. Army Reserve Component. Harris (1991) presents an approach for the distance delivery of a graduate course offered by the School of Systems and Logistics of the Air Force Institute of Technology.

Although the above mentioned literature provides invaluable insight into the use of a particular type of medium in a distributed approach to training, it provides limited insight into how or why a particular course is selected for distribution. Limited guidance is provided for trainers seeking to understand the broader issues which must be considered when deciding to adopt the distributed approach and when selecting a medium with which to deliver training at a distance.

In developing Computer-Based Training (CBT) for the US Air Force, Walsh, Yee, Grozier, Gibson and Young (1992), conclude that "Although the ISD process can be successfully adapted to any instructional medium, there are peculiarities unique to CBT which make planning for it different from traditional training planning" (p. 10).

The US Army has established criteria for the selection of courses for the distributed approach; however, because of the vast number of courses being considered (1300), they cannot examine the content of each course in detail. Selection is based on factors such as "average daily student load" and "Army End Strength". (TRADOC, 1990, p.2-4) It is worth noting also that in taking such a broad approach, the Army considers that conversion from platform instruction to the medium of print can be done quicker and cheaper than to the other media and thus the Army decided that the first priority for

distribution would be those portions of courses appropriate for print. (TRADOC, 1990, p.2-4)

The British Army's School of Training Support (ASTS) has developed a decision-model for distributed training. The model's strengths include an adherence to the systems approach to training and consideration of learner characteristics. The model's weaknesses include limited direction regarding media selection and trainee support. (ASTS, 1992)

**Models For The Design Of Distance Education**

Schieman et al (1992) conducted a review of the literature on the development of university courses at the graduate level, especially those aimed at the education of instructors for distance education, and found that it yields few theory-based guidelines in the form of models or paradigms. They found that heuristics or guidelines for developers are often few in number or altogether lacking. They go on to say that there is little in discussions of course development for the instructional developer to use as a model for developing distance education courses which are uniquely distance education in nature. (p. 1)

Wolcott and Okey (1990), conducted a review of the literature and research on distance education and say the following about this body of literature:

> First, there is no defined base of literature pertaining to the instructional design of distance education. Sources specifically recommending instructional strategies for distance learning settings are few. While design suggestions can be found in the teleconferencing literature and in more general descriptions of distance education, these suggestions are often implied rather than explicitly stated. No model specific to designing distance instruction has been identified.
>
> Second, the literature on designing distance instruction is difficult

> to find. System configurations and applications are more commonly the topics of interactive distance education literature than is instruction. Instruction as the focus of literature on distance education is only beginning to emerge in American publications. Foreign journals address the subject, but tend to emphasize self-contained instructional packages rather than live, interactive instruction. (p. 7)

Finally, Wolcott and Okey say that the evidence of research and theory in the design of distance education is negligible. Although the literature provides descriptions or what they call "think pieces", there are few reports of formal research.

Although models for the design of distance education and distributed training are scarce to non-existent in the literature, general guidelines and issues and ideas for consideration for design of distance education are presented by Baath (1983), Ljosa and Sandvold (1983), Kaufman (1989), Kelly (1990), and Schieman (1990).

Gupta (1989) identifies components of instructional design based on the framework suggested by Reigeluth et al (1978), Baath (1982), Reigeluth (1973), Lewis (1985), Taylor (1986), Kaul (1986), Collett, Kerr and Watters (1988):

> . . . it can be said that the process of instructional design involves the finegrained analysis of the structure of the subject matter; the assessment of the critical learning attributes of the learners; the specification of the clearly defined learning outcomes; the selection of appropriate learning experiences in a planned sequence; the design of appropriate assessment techniques and instruments based on the principles of self-instruction; the design of relevant diagnostic, remedial and feedback systems; and the design and development of learner support systems/services. The result of the instructional design process is an instructional development 'blueprint' outlining what methods of instruction and what instructional media are best suited to a particular course content and specific student population. Such a blueprint also prescribes procedures for instructional implementation, management and evaluation. (p. 172)

Also, Schieman (1992), presents the following issues as pertinent to the design of effective distance education courses: learning styles, isolation, feedback, pacing, learner

control, interaction, motivation, access to reference/resource material, and obscure or non-existent course objectives. (pp. 3-13)

**Communication**

Holmberg (1986), contends that the concern for communication in distance education stems from the awareness that human beings, although learning individually, usually develop their thinking in an advantageous way by talking their concepts and ideas over with some partner.

Farr and Shaeffer (1993) describe the types of communication:

> One-way communication, typified by the lecture, is effective for transmitting information. While the lecture is usually delivered face-to-face, there are other means of "lecturing". Some examples are: oral reports; slide, movie, or video viewing; audiotapes; and records. Some of these methods necessitate using media, some can be adapted to media. Thus, videotapes, audio conferencing, movies, audiotapes, and records are all suitable one-way communication media.
>
> Two-way communication, typified by discussion or small-group tasks, is effective for enhancing thinking skills, promoting understanding of concepts and principles, increasing problem-solving skills, promoting positive attitudes, and developing values. Other two-way communication teaching methods include role-playing, cooperative learning, dramatization, debate, and panels. Two-way communication is facilitated by such technologies as audio teleconferencing, audiographics, asynchronous and synchronous computerconferencing, the mail, and two-way video conferencing. (p.54)

Shale and Garrison (1990) classify communication as one-way if ". . . the message simply stimulates the receiver in isolation . . ." (p. 32). Citing Rowntree (1975), they classify communication as two-way if it is facilitative and allows for the negotiation of meaning and the possibility of mutual learning through dialogue and discussion. Shale and Garrison argue that the most important feature for characterizing distance education is

how communication between teacher and student is facilitated.

> Because the teacher and student are physically separated, distance education must rely on technology to mediate the communication process. However, while considerable attention has been given to the use of technological media, less attention has been paid to the nature of the communication process and the role of technologies in supporting it. (1990, p. 31)

They suggest that the design of more effective and efficient educational relationships demands a broader appreciation of the communicative process and of the technology needed to support the interaction between the teacher and the student appropriately.

**Interactivity**

Daniel and Marquis (1983); Garrison (1985); Holmberg (1989); Mason (1989); Moore (1989); Bates (1990); Smith (1990); and Schieman (1993) emphasize the importance of interactivity as a consideration in the design of distance education.

Bates (1990) identifies two different contexts for interaction:

> . . . the first is an *individual*, isolated activity, and that is the interaction between a learner and the learning material, be it text, television or computer program; the second is a *social* activity, and that is the interaction between two or more people *about* the learning material. It is important to note the difference: *both* kinds of interactional context are necessary for learning,and both need careful examination. (p. 5)

Bates goes on to discuss the myth that students in conventional institutions are engaged for the greater part of their time in meaningful, face-to-face interactions with their teachers. He suggests that in most post-secondary education, this kind of interaction is rare.

> The fact is that for both conventional and distance education

> students, by far the largest part of their studying is done alone, interacting with text books or other learning media. The difference is that for distance learners, this fact is acknowledged by the designers of the teaching materials. The aim is to *simulate* a face-to-face conversation between teacher and student. (1990, p. 5)

In regard to distance education, Bates describes three types of social interaction:

- interaction between the learner and the originator of the teaching material;
- interaction between the learner and a tutor, who mediates between the original material and the learner, by providing guidance or assessment;
- interaction between the learner and other learners. (1990, p. 6)

The first kind of interaction is rare in distance education. The second kind has been the most common, but has, in the past, been attained primarily through correspondence (via the mail service). The third kind of interaction is probably the most important type, but it has tended to be neglected in distance education.

Harris (1991) uses the cognitive activity levels identified by Bloom (1971) as the basis for identifying interactivity requirements of instructional content. The levels used in the decision-model are: comprehension, application, analysis and synthesis. Harris states that ". . . the higher the cognitive level of activity required to accomplish an objective, the more likely that the learner will need some form of interaction" (p. 72). He concludes that application and higher cognitive activities benefit from learner-instructor interaction.

Garrison and Shale (1987) suggest that in attempting to define two-way communication, ". . . it is assumed that simulated structured interaction with sophisticated microprocessor-based courseware, as well as the informal network of human contacts to which the independent adult learner typically appeals, in fact meet the criterion of two-

way communication" (p. 12).

It is safe to say that the informal network of human contacts to which Garrison and Shale refer would also be present in a military training setting. It is also safe to say that the informal network would be accompanied by a highly structured formal network of contacts provided by the organisations. Garrison and Shale point out that with university level distance education, " . . . the influence of the formal organisations is largely administrative and indirect" and that ". . . the individual [professor] basically teaches what and how he/she pleases. The influence of the organisation is largely limited to providing the technical structure for the actual delivery of the course as well as providing credit" (1987, p. 12). Because the military is preparing the learner to perform a specific job, in a setting characterised by firm authority and discipline, instructors are told specifically what and how they will teach, and the influence of the organisations is, of necessity, powerful and direct.

**Media Selection For Distance Education and Distributed Training**

There is little direction to be gained from the literature regarding the selection of media for distance education. According to Curran (1990):

> Many of the studies of media are of limited interest to distance educators in that they relate to 'in-school' use, rather than to distance education, where economies of utilization can be quite different. All suffer from the disadvantage of being concerned with a specific programme and, as a consequence, are of limited general relevance. (p. 29)

Bates (1990) suggests that there is a vital need for a set of procedures, or a check list of questions that should be answered irrespective of the type of institution or distance

education program to enable appropriate decisions to be made regarding the choice and application of different technologies. Selection models related to media have been tested and/or developed for use in civilian and military distributed training but most do not take a broad perspective of media. Rather, they focus on selection/decision criteria for a specific medium. McDonald, Weisenford, Fleeton, Kreiner and Hodak (1990) present a course selection model to identify U.S. Navy courses suitable for delivery via video teletraining; Lane (1992) examines a selection model for use with video programmes; and, Wagner and Reddy (1992) emphasize that one must not be hardware driven in media selection, rather one should assess media appropriateness based on the types of learning experiences one wishes to replicate through the medium or media selected.

Wong (1987) suggests that the rapid growth of instructional technology has made available a wide range of media to distance education and that wise use of the media is essential. She refers to Forsythe's (1986) suggestion that an effort must be made to understand the nature of the human-to-human and the human-to-machine interactions as they occur in the learning system.

Farr and Shaeffer (1993) conclude that objectives and methodology are most germane to the proper selection of media in distance education.

> In considering the match between objectives and methodologies, it is apparent that the type and amount of communication required are critical elements. Instruction must be varied in accordance with these elements. Simple information transmission needs only one-way communication, whereas all other objectives can benefit from two-way communication. If the objective mandates dialogue or discussion, then two-way communication is mandated. (p. 53)

**Media Used in Distance Education/Distributed Training**

Garrison (1985) proposes a taxonomy of technologies and media for distance education. He argues that "the development of distance education can be structured into three generations of technological innovation - correspondence, telecommunications, and computers" (p. 235). Garrison uses the term generation to suggest the building upon previous capabilities new media can be combined with older media to provide a greater range of choice for the design of effective distance education delivery systems. These three generations of technologies provide two-way communications. Garrison suggests that in distance education communication must be two-way, but he does not insist that the communication must take place between two persons. Because, for example, computer assisted learning (CAL) courseware may possess all of the characteristics of good feedback (as identified by Store & Armstrong, 1981), Garrison concludes that CAL is capable of effective two-way communication in the delivery of education at a distance.

Garrison (1989) classifies distance education media which provide only one-way communication as ancillary media. These non-interactive media include: print materials; audio and video cassettes; audiographics devices such as facsimile, slow-scan television, compressed video, telewriting, and videotex (which he says may also support two-way communication); laser videodisc; and broadcast (radio or television).(p. 50)

Harris (1991) divides media into two categories, those which provide interactivity and those which do not. Technologies which do not provide interaction include: print (standard text); audio-cassettes, and video-cassettes. Those which provide interaction include: print (programmed text); CAL; computer-mediated communications (CMC);

shared graphics devices; audio conferencing; and, video conferencing. Harris includes programmed text in the media which provide two-way communication because they provide guidance and feedback. Learners proceed through the printed material in a non-linear fashion; answer questions on the material; and, based on their answers, are either directed to continue, or to a point at which material is reviewed for remedial purposes. The media used in distance education and distributed training are described in Table 1.

Moore (1989) claims that the main weakness of many distance education programmes is their commitment to only one type of medium. In regard to media-affected interactivity, Andrews (1989) concludes that: "design can compensate for many hardware limitations, but unlimited hardware and production will have little effectiveness if the overall design is poor" (p. 13). Bates (1990) concurs: "What matters is the way the teaching material is designed, and the objectives of the teaching, rather than the medium used" (p. 12). Shale (1988) suggests that technologies that inherently provide for only one-way communication will always be lacking in the capability to support the validation of knowledge. When a distance education system is based on a technology that is only one-way, special efforts must be made to close the communication loop in some way. There is a variety of technologies available to do this, and often, pragmatic issues such as cost and availability will dictate which technology is selected. Shale concludes that "In general, we can only offer the best we can do, recognizing that the more we can do to support interaction the better . . ." (p. 32).

| MEDIUM | CHARACTERISTICS OF MEDIUM | REFERENCES |
|---|---|---|
| **Print Material** | **Standard Text:**<br>**Advantages:**<br>Extensive availability of courseware; can be accessed anywhere, at any time; user friendly; can be reviewed at will at any sequence.<br>**Disadvantages:**<br>Lack of interactivity; generally long feedback cycle; trainee must be able to learn independently; trainee must have competent level of literacy.<br>**Cost Considerations:**<br>Cost-effective mode, particularly if delivered via postal service. | Holmberg (1981); Kaye (1981b); Kearsley (1984); HSP Humanite (1988); Bates (1990b); Timmers (1990); Jonassen & Tessmer (1991); Bates (1992). |
| | **Programmed Text:**<br>**Advantages:**<br>Provides feedback and interactivity; flexible (can be accessed any where or any time); provides remedial information.<br>**Disadvantages:**<br>Instruction is in very small steps - can be difficult for learners to understand the larger view of what they are learning.; bulkiness of textbooks; difficult to revise material; role of instructor not clearly defined; not suitable for problem-solving or decision-making.<br>**Cost Considerations:**<br>High development costs; long development time. | Kearsley (1984); Romiszowski (1988); Harris (1991). |
| **Audio-Cassettes** | **Advantages:**<br>Material can be prepared quickly; can be accessed at almost any time or any place; communication can be personalized; standardization of equipment; integrates easily with other media.; suitable for aural learning (language, music etc.) ; trainees have limited control over pace of learning (ability to start and stop tape) ; good complement to writen or visual material.<br>**Disadvantages:**<br>Lack of feedback and interactivity; may require reliance on postal service if used for communication between trainee and instructor required.<br>**Cost Considerations:**<br>Equipment inexpensive; audio-cassettes inexpensive to produce and duplicate. | Kearsley (1984); HSP Humanite (1988); Garrison (1989); Harris (1991); Jonassen & Tessmer (1991); Verduin & Clark (1991). |
| **Video-Cassettes** | **Advantages:**<br>Flexible - user can choose time for viewing program; can be integrated with other forms of instruction or media; read/wr ite capability; readily available; familiar to most individuals; long recording time (4-6 hours); trainee has limited control over pace of learning (able to replay tape); appropriate for visual learning; good for transmitting knowledge.<br>**Disadvantages:**<br>Medium is relatively linear and lacks feedback and interactivity; may require reliance on postal service for distribution; sequential access; poor handling of still images; image degrades with use; does not integrate well with computer.; not suitable for achieving higher level cognitive skills.<br>**Cost Considerations:**<br>Medium costs are low; production costs are high. | Kearsley (1984); HSP Humanite (1988); Bates (1991); Harris (1991); Jonassen & Tessmer (1991); Verduin & Clark (1991). |
| **Computer Assisted Learning (CAL)** | **Advantages:**<br>Interactivity between learnerand instructional material; learners receive immediate and constant feedback; microcopmuters provide flexibility with regard to time and place of learning; learning tends to be self-paced; instructiona can include practice, simulations, tutorials and problem-solving; variety of presentation modalities including audio, graphics, text, colors, and animation; addition of CD ROM vastly expands information available.<br>**Disadvantages:**<br>Users must be trained to use the technology.<br>**Cost Considerations:**<br>Very expensive to develop. | Kearsley (1983); Jones (1984); HSP Humanite (1988); Garrison (1989); Bates (1990b); Smith (1990); Gastkemper (1990); Jonassen &Tessmer (1991); Verduin & Clark (1991). |

Table 1. Media in Distance Education and Distributed Training

| MEDIUM | CHARACTERISTICS OF MEDIUM | REFERENCES |
|---|---|---|
| **Computer-Mediated Communication (CMC)** | **Includes : electronic mail and bulletin boards; computer conferencing and on-line databases.**<br>**Advantages:**<br>Highly interactive - two way (a)synchronous communication ; E-mail and bulletin boards invoke deeper analysis and reflection of messages; standardization of equipment is not important (any computer with a modem will work); great variety of information can be tranferred (text, graphics, computer programs, data files).<br>**Disadvantages:**<br>Availability of equipment (although modems inexpensive, they are complex to set up); users must be trained.<br>**Cost Considerations:**<br>Long distance charges can be high. | HSP Humanite (1988); Garrison (1989); Harasim (1989); Kaye (1987); Mason (1989); Nipper (1989); Jonassen & Tessmer (1991); Bates (1992); Davie (1992). |
| **Shared Graphics Devices** | **Includes: facsimile, optical scanners, telewriter , electronic blackboard (EBB) or tablet, and slow-scan or freeze frame video.**<br>**Advantages:**<br>Telewriter/EBB - available for most computers; allows remote blackboard type instruction; provides interaction ; instructor avle to monitor student progress. Telewriters transmit graphic and textual information . EBB - both voice and data transmitted over a single line.<br>Facsimile/optical scanners - high speed and good quality transmission ; practical alternative to postal and courier delivery for hard copy transfer.<br>Slow-scan/freeze frame video - combines live limited motion visual with audio.<br>**Disadvantages:**<br>Telewriter/EBB - generally session specific as to time; more lead time required than for traditional instruction; users must be trained; provides only written interaction unless combined with audio.<br>Facsimile/optical scanners - high supply and line costs when transmitting large amounts of information; limited to hard copy data transmission.- data cannot be manipulated.<br>Slow-scan/freeze frame video - limited motion.<br>**Cost considerations:**<br>Line charges can be high if large amounts of data trasnferred; long distance charges can be high. | HSP Humanite (1988); Garrison (1989); Jonassen & Tessmer (1991). |
| **Audio Communications** | **Includes: conference calls; conference calls and amplified speaker phones; desktop audio sets; and audio teleconferencing.**<br>**Advantages:**<br>Communication using telephone lines offer two-way, immediate, interactive communication between two people at two locations; between an instructor and several people at one location;or, between people at a number of locations. Lead time not much longer than for traditional classroom instruction.<br>**Disadvantages:**<br>No visual contact between learners and instructor; interaction modified by tecnological protocol; learning must occur at a specified time and place.<br>**Cost Consideration:**<br>High costs acssociated with long distance charges. | Robinson (1984); HSP Humanite (1988); Bramble (1990); Garrison (1990); Jonassen & Tessmer (1991); Schieman (1992). |
| **Video Communications** | **Includes: Full or limited motion; transmitted one or two-way iwth two way audio. Limited video options include: slow scan video, picture phoe, and compressed video.**<br>**Advantages:**<br>Learners have visual contact with instructor (and with two-way video vice versa) ; immediate interaction between instructor and learners and among learners; (contributing to to learner motivation); instruction is more individualized because of contact with instructor.<br>**Disadvantages:**<br>Interaction modified by technical protocol; learning must occur at specified time and place; technical expertise required to operate equipment (instructors require training) .<br>**Cost Considerations:**<br>High costs related to satellite dishes, long distance charges , and equipment purchase/rental. | HSP Humanite (1988); Keller (1989); Bramble (1990); Garrison (1990); Gastkemper (1990);Gunawardena (1990); Jonassen & Tessmer (1991). |

Table 1. (continued) Media in Distance Education and Distributed Training

**Target Population**

Cernicek and Hahn (1991) state that student variables must be recognized, identified, and accommodated for distance learning to be successful. In their research, they assess the relative importance of learner variables on the effectiveness of distance learning. Experts in distance learning (identified as those having publications and ongoing work and influence in the field of distance education), were asked to respond to a survey in which they rated the importance of a number of variables to the effectiveness of distance learning (versus that of a traditional classroom). The following variables were selected from the literature and included in the survey: reading level/education level; gender; age; socioeconomic status; geographic location/geographic dispersion; computer experience; typing skill; degree of student autonomy; previous distance learning experience; and motivation.

Cernicek & Hahn report that reading level, student autonomy, and self-motivation were all identified as having particular importance in distance learning. They recommend that these variables be assessed before a student is assigned to a distance learning course and that students not possessing these qualities be provided with special support. The following are examples of such support: if reading levels are inadequate, using technologies which do not focus so heavily on reading skills such as audio graphics, CAL, and audio conferencing; providing a "safety net" to allow student-controlled access to an instructor (via e-mail, a computer conference, and/or telephone hotline); and embedding motivational tactics in the course material, such as giving short and simple assignments at the beginning of the course to build the students' confidence in the distance

learning course (1991, p. 464).

According to Holmberg (1977), it is important to know something about the students, their goals, social and educational background, incentives and motivation, why they study 'at a distance' and what they expect. The CF uses target population reports, which are routinely written in the design phase of the CFITS, to provide the design team information about trainees that will influence the design of the course. (DND, NDHQ, 1992)

**Motivation:**

Motivation can be considered as either intrinsic or extrinsic motivation. Kearsley (1985) advises that intrinsic motivation is created by the design of the instructional materials. According to Andrews (1989), knowing the audience is critical in distance learning and every effort should be made to involve students in courses from the start. Caution should be exercised to eliminate technology anxiety if the course is using the latest methodologies.

Kearsley (1985) suggests that extrinsic motivation is provided by the determination and concentration of the learner and by incentives to complete the instruction (e.g., grades, promotions, eligibility, etc.). Well-designed distributed training programs recognize the importance of extrinsic motivation and establish contingencies that facilitate completion of self-study materials. As an example, he cites a series of self-study courses that must be completed in order to attend a classroom lecture, group discussion, or a hands-on lab that are scheduled at specific dates.

Another approach Kearsley suggests to provide extrinsic motivation is to teach students how to manage their own learning activities (i.e., study skills). Since most individuals have never had any formal instruction on how to learn or any experience with self-study learning (distance education or distributed training), he recommends teaching them simple techniques for tracking learning progress, active listening or reading, or self-testing that facilitate individualized learning.

Andrews (1989) claims that motivation and extrinsic rewards create greater interactivity and learning. He emphasises the circular relationship of induced reinforcement between motivation and interactivity for both the instructors and the students which can foster a sense of community. Fostering a sense of community is certainly important in military distributed training. According to Skinner (1993), the greatest concern of the U.S. Marine Corp regarding the distributed approach to training is the potentially detrimental effect on 'esprit de corps'.

**Modularization**

Modularization, already mentioned under the heading of intrinsic motivation, is defined as breaking up the instructional content and learning activities into smaller, more manageable "chunks", based on length or function, in order to facilitate individualized instruction. According to Kearsley (1985) modularization can be achieved in various ways: pages or screens can be designed so that they convey a single idea or principle; units can be designed to consist of the smallest number of pages or screens that are needed to teach a single concept or procedure; and modules may be organized according

to instructional functions, (e.g., main concept, example, help, practice, feedback, test, etc.). Modules which are seen only when needed can also be developed for help or remediation.

Modularization of instructional materials is particularly important for trainees of the Reserve Component. Typically, a Reservist has limited time available to undergo training. Modularizing instructional materials not only allows the Reservist a chance to complete a recognizable portion of a course, but also provides the Training Establishment with a means of tracking the trainee's progress.

**Feedback**

Store and Armstrong (1981) suggest that feedback is essentially a process of communication and they propose several characteristics of good feedback: immediacy, regularity, explanatory (rather than judgemental) comments, conciseness, and clarity (pp. 150-151). They emphasize that it is helpful to think of feedback as a 'people process'. It brings into sharp focus the need to create a supportive and non-threatening *tone* for effective feedback to occur.

As previously mentioned, Garrison (1985) concludes that feedback of this quality provides effective two-way communication in the delivery of education at a distance and that it can occur when the delivery mode is CAL.

**Learner Support - The Student Subsystem:**

This section deals primarily with what Rumble (1986) describes as the student sub-

system of a systems model of distance education. This sub-system manages their progress through the institution: it admits students; allocates them to course, local centres and tutors; collects fees; ensures timely delivery of course materials; assesses students' progress; and maintains records.

Holmberg (1981) states "the organization of conventional universities and schools does not meet the requirements of distance education" (p. 97). With this situation in mind, he identifies those services which he considers to be essential to and those which he considers to be optional for a successful distance education program. He lists the administrative tasks which should be carried out by an organisations regardless of the cultural and sociological contexts in which distance study is made available:

1. Correct, competent and courteous treatment of all letters, correct delivery of instructional material, information circulars, etc., and proper reception of students calling in person or on the telephone.
2. Short turn-around time for assignments submitted in writing, on audio-tape and other media and for letters applying for information and advice, containing questions, requests, complaints and suggestions, etc.
3. Practical provision for the educational use of the telephone, the computer and other aids included in the working methods.
4. Accurate, easily available registration of data.
5. Checking on students' progress and procedures for reminders to those who fall behind or seem to be in danger of dropping out.
6. Facilities (when needed) for supplementary teaching (telephone tuition, oral refresher courses, laboratory instruction, etc).
7. General efficiency in all the above activities at a reasonable cost. (p. 102)

The role of the instructor in a distance education environment is considerably more diverse than that of a teacher in a traditional setting. Coldeway (1982) and Meija (1984) (as cited in Chacon-Duque, 1985) both argue that an instructor in distance education should become a facilitator concerned with academic counselling, follow-up on students' progress, feedback on performance, guidance regarding study skills, quality control of

learning materials, interaction with other tutors, and coordination between institution and students. Coldeway (1980) suggests that contact with a tutor facilitates course completion regardless of who initiates the interaction, and that contact with a tutor helps maintain student motivation at a more constant level. Linked directly with determining the role of the tutor/instructor is determining the type of contact (face-to-face, telephone, mail correspondence, etc.) that will be provided between the institution and the learner. To some extent, the type of contact will be influenced by the media selected to deliver the course (teleconferencing, video teletraining, etc.). Holmberg (1986) discusses the value of face-to-face contact and describes a number of situations in which he considers it to be essential. Stein (1960) concludes that one of the most important aspects of instructor-student interaction by whatever medium, is personalized contact. Similarly, survey results from Project REDEAL at Athabasca University indicate students value the "human element" in their contact with a tutor. (Coldeway, MacRury and Spencer,1980)

Daniel and Marquis (1983) claim that distance education tutors must be trained to do their jobs and that their training should include information on the structure, organization and methods of the remote learning system which is employing them and clear directives on their role in the system. Instructors must adopt a facilitative role in distributed training and they need specialized training which emphasizes the differences between distributed and traditional (face-to-face) instruction and which provides the skills needed to function in the distributed environment. (Coldeway, 1980; Holmberg, 1981; and, Rekkedal, 1982) Research at Athabasca University indicates that tutors require special training in facilitative behaviour such as asking open-ended questions and

interactivity on the telephone. (Coldeway, 1980)

**Design, Development, Production and Distribution of Instructional Materials - The Materials Subsystem**

Rumble (1986) describes these activities as the materials subsystem of the systems model of distance education. Materials development includes the activities of curriculum planners, teachers or instructors, content experts, instructional designers, media producers and others, whom Rumble refers to as "transformers" (eg. editors, graphic designers) who help in the production of 'media products'. The output from their activities are prototypes which, through the production process, are turned into finished products, in print, audiovisual, and/or computer software etc. form. These materials can then be packaged as a course and distributed to the students and tutors involved in the course, through mailing, broadcasting, or data transmission facilities.

Fales and Burge (1984) recognize that effective and efficient course design is often best handled by a team. They consider the team approach to be essential in most distance learning situations because: (a) many faculty, despite their content expertise, are not trained in adult learning facilitation, educational technology, graphic and instructional design, editing, etc; (b) a person responsible for content, cannot also effectively hold the student orientation and perspective which is critical in formative evaluation procedures; and, (c) many "classroom" faculty tend to view distance education as a form of second-rate learning for geographically isolated students using dull correspondence materials.

**Management of Distance Education/ Distributed Training:**

Rumble (1986) recommends that a business-like approach be taken to the planning, scheduling and managing of materials development, production and distribution. He suggests that in business these tasks are covered by the terms "production management" (the management of the resources required to produce the goods) and "operations management" (the management of the resources required to provide services). (p. 182)

DND, NDHQ (1991) describes the infrastructure of CF training establishments (schools) conducting "traditional" training and identifies the tasks related to each of the positions within that infrastructure. It is emphasized in this document that the allocation of tasks is not unalterable. The introduction of the distributed approach would likely have an impact on the existing infrastructure. Simpson (1990) claims that for the revolution in communication technology to have an impact on U.S. Navy training, it will require a revolution in the way that Navy training is organized and managed. He identifies what he considers to be the implications of such a revolution:

1. More training will be delivered remotely and less in resident schools.
2. The number of classrooms devoted to resident training will decline.
3. Schools will employ fewer personnel who will have received different training and will be effective users of the new technology (e.g., conducting training using television).
4. Schools will assume new roles as managers and repositories of computer-based instructional resources (e.g., CAI and ICAI programs, simulations, games, and course-management software).
5. Schools will manage the use of the network's resources for training-related purposes (e.g., discussion groups, bulletin boards, and computer conferences). (pp. 17-18)

**Resource Requirements and Costs:**

Kearsley (1982) defines cost/benefits analysis as a technique or method for

assessing the relationship between results or outcomes and the costs required to produce them. He says that cost/benefits analysis allows you to:

- Justify existing training programs.
- Achieve a better understanding (hence, control) over a training system.
- Determine how to reduce training expenditures and hence, increase efficiency.
- Determine how to improve training results through increased effectiveness.
- Evaluate the feasibility or payoffs of a proposed training program. (pp. 1-2)

Kearsley goes on to describe four types of models commonly used in cost/benefits analysis: resource requirements models; life cycle models; benefits models; and, productivity models.

> If your primary interest lies in identifying a cost savings (i.e., improved cost efficiency), then either the resource requirements or life cycle models will be appropriate. If you are concerned with assessing costs at a single point in time, then the resource requirements model is sufficient; if you want to assess costs across the entire life cycle, then a life cycle model is needed.
> If you need to look at improved results rather than (or in addition to) costs savings, then benefits or productivity models are called for. Benefits models will allow you to determine the relative effects of different training parameters in terms of desired goals and outcomes. Productivity models permit the examination of different cost/benefit functions for a particular training situation. [Or] none of these four models may be quite right for you and you may [want to] develop an *ad hoc* model [which] will combine or involve subsets of the four major models. (pp.19-21)

He suggests that the selection of which model to use will basically depend on two factors: What questions are you trying to answer? How much time and money can you afford to spend on the cost/benefits?

Rumble (1986) identifies the costs typically incurred in the development, production and presentation of distance taught courses. Later, (Rumble, 1987), he discusses cost efficiency and cost effectiveness in distance education, and explains why he considers that distance education can be cheaper than conventional education.

Orlansky and String (1979) caution that a comprehensive effort to collect data on all the relevant costs of all the methods of instruction used in military training would be a very large effort. Their research demonstrates that (with the U.S. military), available cost data are unsatisfactory for conducting cost-effectiveness evaluations of computer-based training and other methods of instruction used in military training. Decisions about using or not using new methods of instruction must be made without the benefit of reliable cost data.

Hagman and Dykstra (1991) provide guidance on the use of the Training Technology Cost Analysis Templates (TTCATS) software program. TTCATS contains seven individual subprograms, or templates, that customize the LOTUS 1-2-3 spreadsheet to help project the cost of delivering training to geographically distributed locations. Although TTCATS is intended to address the distributed training requirements of the U.S. Army National Guard and Reserve, its cost estimates apply generally to most situations in which trainees cannot meet at the same place for training.

**Summary**

This chapter reviewed the literature on distance education and distributed training. The purpose of the review was to identify training development issues that must be considered in selecting a distributed approach to training. Distributed training was defined and the need for it was established. The review then focused on issues pertaining to three main areas:

a. ***The Training Program,*** including the desirability of a systems approach to

implementing distributed training, the need for precisely stated objectives, the importance of communication and interactivity to design and media selection, and the advantages of modularisation;

b. ***The Trainees,*** including the requirement to consider their background, characteristics and needs in a non-traditional learning environment; and

c. ***Support***, including the instructional and administrative support essential to sustain trainees learning at a distance from the central school and outside the traditional classroom setting.

# CHAPTER FOUR

# METHODOLOGY

## Introduction

The decision model was produced in two main stages. In the first stage an initial version of the model was produced which presented for consideration factors derived from a review of the literature on distance education, distributed training and the CFITS. In the second stage the model was modified to reflect expert advice solicited by employing a modified Delphi technique. The final version of the model appears as Appendix A.

## Production of the Decision Model, Version One

A review of the literature on distance education and distributed training was carried out as described in Chapter 3. The purpose of the review was to identify all those training development factors relevant to a distributed approach to training that must be considered in determining if a particular training program is suited to that approach. Because a distributed approach to CF training must adhere to the principles and processes of the CFITS it was also necessary to identify factors associated with that training system that would influence the selection of distributed training. The CF Manual of Individual Training and other policy and guidance documents associated with the CFITS were, therefore, also reviewed.

Version one (similar in form to the final version which appears as Appendix A) presented for consideration factors derived from the literature review. The model was

designed and produced as an algorithm. It consisted of series of boxes which presented factors for consideration (in the form of questions), information, or directions as to how to proceed through the model. Users were asked to respond "yes" or "no" to each question and, depending on their responses, were directed either to proceed through the model or exit. If users proceeded to the end of the model they would have satisfied themselves that it would be sound practice to employ a distributed approach to training for the program under consideration. If they exited the model at any point they would have decided that it would not be sound practice to do so.

Users were advised that the model did not always make the "proceed or exit" decision for them. Based on their responses to some of the questions they might only be informed that employing a distributed approach would create difficulties that would have to be overcome. They would then have to make the decision to proceed or not based on their subject matter expertise, assessment of factors external to the study and evaluation of the difficulties involved.

Amplification and/or clarification of factors to be considered was provided in the form of notes which accompanied the model. Users were advised that they should refer to those notes as they worked their way through the model. (Notes accompany the model in Appendix A). The model itself was divided into eight main sections as described in Figure 2.

Each section of the model is briefly commented on below:

***1. Preliminary Considerations:*** At an early point in the decision process a board must be convened to determine if a particular training program is suited to a distributed

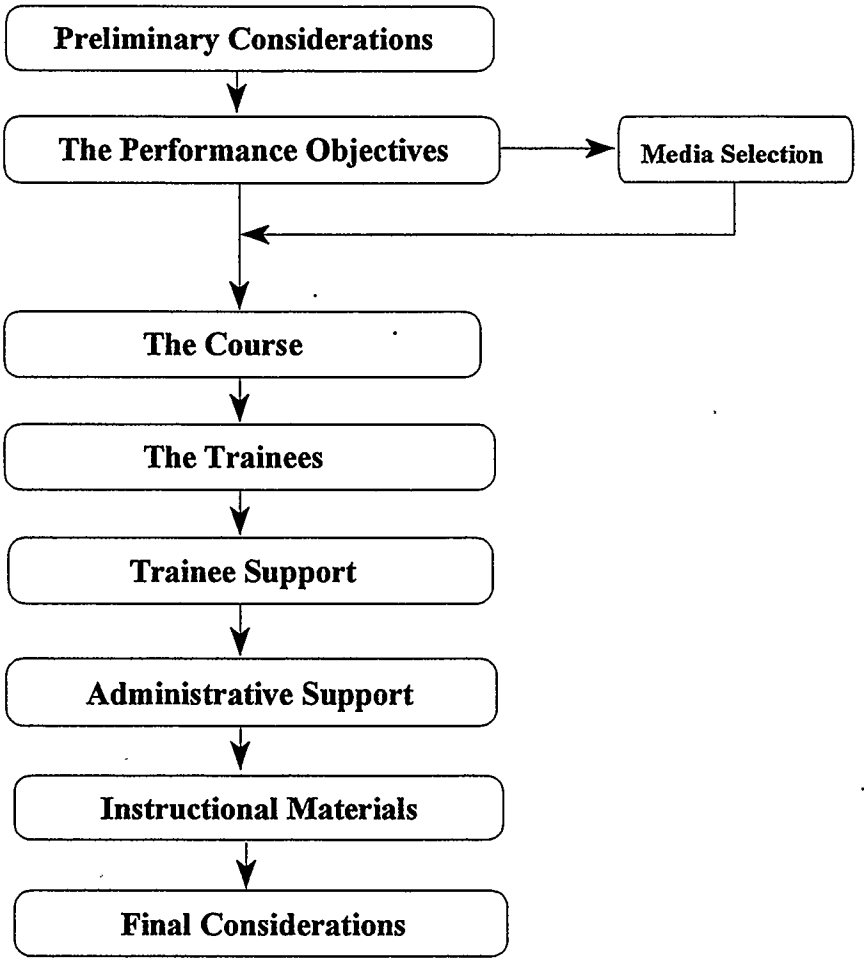


Figure 2: Sections of the Initial Decision Model

approach. The board should comprise people best qualified to sit on it, and those people might have to be brought in from other schools and units. Before the board is assembled, therefore, it is important to make sure that there are no over-riding considerations that would immediately identify the course as unsuited to distributed training. Those preliminary considerations were presented in this section.

***2. The Performance Objectives:*** In this section factors were presented which must be considered in determining if each individual course PO is suited to a distributed approach. Users were advised to work their way through this section of the model one PO at a time considering each factor in the light of that PO's type (psychomotor, cognitive, affective), contents and characteristics. They were also advised that they should refer to the EOs which support each PO in order to respond fully and accurately to the questions and directions in this section. If users judged all POs suited to a distributed approach they could feel justified in selecting that approach for the entire course. If some were suited and others not, users would have to decide how to proceed. Possibilities included: rejecting the course as a candidate for distributed training; omitting or modifying POs unsuited to distribution; and conducting part of the course in a central school and distributing the remainder.

The other purpose of this section was to enable the user to determine, for each PO, the minimum media requirements for effective distributed instruction (based primarily on the interactivity requirements of the instructional materials). The media selection portion of this section was adapted from the work of Harris (1991) in developing an approach for the distance delivery of resident curricula at the US Air Force Institute of

Technology.

*3. The Course:* In this section users were required to consider the way in which the course as a whole could be organized for instructional purposes. It was suggested that they order POs according to their logical instructional sequence, identify delivery/technology-based groupings that could be applied, and then determine the media requirements for each group of POs as a unit of instruction.

*4. The Trainees:* The value of a target population report providing information about prospective trainees was examined in this section. It was noted that such information is helpful in deciding what training is required and how it should be presented, and that it is essential in determining the start point of the course.

*5. Trainee Support:* The role of tutors, the tasks they perform and the training they might require, as well as the way in which trainees are "connected" to the training establishment, were examined.

*6. Administrative Support:* In this section users were asked to consider the requirement for the lower level administrative support necessary to sustain a distributed approach on a day-to-day basis.

*7. Instructional Materials:* Issues related to Instructional Materials including copyright, development, production and distribution were presented for consideration.

*8. Final Considerations:* Having worked their way through the decision model users were asked to decide if resources were available or could be made available to distribute the course under consideration, and if the need for the course could be satisfied. It was suggested that they might need to determine the cost of the resources required more

precisely. Although the model was not intended to determine the cost of resources required precisely, a brief description of what should be taken into account was provided.

**Expert Review of the Model**

Due to time constraints an expert review of the model, elicited by employing a modified Delphi technique, was used in lieu of field testing. Helmer (1966) describes the Delphi Technique as a method for the systematic solicitation and collation of expert opinions, applicable whenever policies and plans have to be based on informed judgement. Instead of using the traditional approach to achieving consensus through open discussion the Delphi Technique in its most basic form eliminates committee activity altogether. Thus it reduces the influence of certain psychological factors such as the unwillingness to abandon publicly expressed opinions and the "bandwagon effect" of majority opinion. The Delphi Technique replaces direct debate by a program of sequential individual "interrogations" (conducted by questionnaires) interspersed with information and opinion feedback (follow-up questionnaires summarizing the distribution of responses previously obtained are given to the respondents and each is asked to reconsider his/her own answer). Such feedback may serve to stimulate the experts into taking into account considerations they might have neglected or on first thought considered to be unimportant. (Helmer, 1966, p. 1-2)

In general, the Delphi Technique features: (1) anonymous response--opinions of members of the group are obtained by formal questionnaire (a way of reducing the effect of dominant individuals); (2) iteration and controlled feedback--interaction is effected by

a systematic exercise conducted in several iterations, with carefully controlled feedback between rounds (a way to help reduce noise); and (3) statistical group response--the group opinion is defined as an appropriate aggregate of individual opinions in the final round (a way of reducing group pressure for conformity and the biasing effects of dominant individuals).

From his research in the use of the Delphi technique conducted with the US Air Force, Dalkey (1969) cautions that:

> ...the most one can derive from the experiment with regard to applications to other types of subject matter is the presumption that there will be a point beyond which there will be diminishing, perhaps negative returns to further time in thinking about the estimate; and probably this point of diminishing returns will be lower than normally supposed. (p. 76)

The Delphi technique was modified (statistical group response was excluded) and employed in the present study to produce a decision model which incorporated, to their satisfaction, the advice of the four respondents who participated in the study. The four respondents were requested to participate because of their expertise in distance education/distributed training and/or the CFITS. Two of the respondents were CF trainers, the other two civilian academics. They were assured that their participation would conform to ethical standards established by the University of Calgary as reflected in the consent form which appears as Appendix B. Ethical approval of the present study was then sought and received as indicated in Appendix C.

The form soliciting comments on the decision model from the four expert respondents is included as Appendix D. They were requested to state what they found unacceptable about any block and what they would do to make it acceptable to them. A

covering letter (included as Appendix E) informed respondents of the way in which it was intended that their comments and suggestions would be used. (The comments provided by all respondents would be collated and returned to them; they would then be asked to rate the comments according to the degree to which they agreed with them; the comments would then be used selectively, and in a manner influenced by the way in which the respondents rated them, to modify the model). It was hoped that this process would result in a revised model that would meet with the approval of all four respondents.

Analysis of respondents' comments revealed that whenever there were two or more comments on the same issue they almost invariably supported rather than opposed each other. In the very few instances in which comments seemed to indicate possible disagreement among the respondents the apparent conflict was readily resolved by explaining an idiosyncracy of the CFITS or of the distributed approach with which a respondent had not been familiar. It was also evident that the two military respondents were, predictably, more concerned than their civilian counterparts with how the model would be applied in a CFITS and a CF context. There was no disagreement among the respondents in this regard as, understandably, the civilian respondents either did not feel strongly enough about, or were not familiar enough with, such matters as command and control, management or organization in the CF to comment on them. Because the respondents' comments supported each other as described there was no requirement to resolve differences or choose between opposing points of view before drawing on them to modify the model. It was judged not necessary, therefore, to ask the respondents to rate the comments, as had originally been intended. Instead it was decided to provide the

respondents with a form (included as Appendix F to this study) on which were displayed (1) the comments provided by the four respondents; (2) the author's reaction to those comments; and (3) the effect of the comments on the model. Participants were simply asked to state whether or not they were satisfied with the proposed modifications to the model. (In the event that they were not satisfied they were requested to explain why they were not).

In general the respondents indicated that the decision model was fundamentally sound and therefore required no major modification. It was proposed by the author that a majority of the comments and suggestions provided be used to modify the model as described in Appendix F; however, the only significant structural and procedural change was that proposed for Section 2. The initial version of the model required users to work their way through this section one PO at a time to determine (1) if each PO was suited to a distributed approach, and (2) the minimum media requirements for effective distribution of instruction for each PO. The proposed change would remove the emphasis from the individual POs and place it on instructional content. It would require users to group the instructional content based on learning strategies/activities appropriate to the content and then to develop instructional modules which could be considered for distribution and for which media requirements could be identified.

The CF respondents pointed out that a recent change in training policy resulted in the combining of the formal course and the on-job training program into a single training program. Trainees will now be required to complete an entire program before they are able to achieve the program POs. This policy change made it necessary to

replace all references to "course" in the model with "program", and to make some minor changes to descriptions and explanations contained in the accompanying notes.

The remainder of the modifications proposed were intended to enhance the validity and the clarity of the model but would have no appreciable effect on its structure or on the procedures to be followed. Those modifications are described in Appendix F.

The respondents stated that they were satisfied with the modifications proposed for the model.

**Final Revisions**

Based on the suggestions agreed upon, the model was then revised accordingly. The revised model appears in Appendix A.

**Summary**

This chapter described the methodology employed to produce a decision model for the selection of distributed training. An initial version of the model based on factors derived from a literature review was modified to reflect advice provided by four expert respondents. That advice was solicited and used by employing a modified Delphi technique. The original intent of employing that technique was to attain consensus among the respondents as to which of their comments and suggestions were the most appropriate for use in improving the model. It was found, however, that their comments revealed little or no disagreement among them. Their comments were incorporated selectively into a modified version of the model to the satisfaction of all four respondents.

# CHAPTER FIVE

# SUMMARY, RECOMMENDATIONS AND IMPLICATIONS FOR FURTHER STUDY

## Introduction

Despite the adoption of the CFITS, a training system characterised by the principles of performance orientation, maximum efficiency and the systems approach, the cost of training in the CF remains high. One of the reasons for this is that most formal training is conducted at central schools which may be located thousands of miles from a trainee's home unit. The cost of travel, accommodation and additional time off the job must be added to the cost of implementing the CFITS. Moreover, hard pressed schools cannot always provide training when it is most needed by trainees. CF trainers are now looking for ways to alleviate the cost and limitations associated with conducting training at central schools, and they view distributed training as a potentially feasible alternative. Distributed training would only be selected for courses judged to be suited to such an approach. Unfortunately there is currently little help available to trainers who would have to decide if a program is suitable for distributed training. The purpose of this study was to develop a decision model to assist CF trainers in making informed decisions regarding the selection of the distributed approach to training.

## Summary of the Project

The project was completed in two stages. In the first stage a version of the

decision model was produced which presented factors for consideration derived from a review of the literature on distance education, distributed learning and the CFITS. In the second stage the model was modified based on expert advice elicited from four respondents by employing a modified Delphi technique.

The original intent of employing the Delphi technique was to obtain a wide range of comments and suggestions from the four respondents. They would then be asked to rate the collated responses according to the degree to which they agreed or disagreed with them. This process would be repeated as necessary to reach a consensus as to which responses should be incorporated into the model to improve it. In the event, their comments revealed no significant disagreement among the respondents and there was therefore no requirement to resolve differences between them or choose between opposing points of view before drawing on them to modify the model. The respondents were informed as to the way in which it was proposed to modify the model based on their comments and suggestions and were requested to state if they were satisfied with those modifications. All four respondents stated that they were satisfied with the proposed modifications. The modifications were made and the final version of the model was sent to the respondents for their information only.

Although a majority of the comments and suggestions provided by the expert respondents were incorporated into the model to enhance its validity and clarity, the only significant structural and procedural modifications were those suggested for Sections 1 and 2. In Section 1 of the initial version of the model users were required to produce Performance Objectives (POs) and Enabling Objectives (EOs) for the content of any new

course being considered for distribution, and they were required to work their way through Section 2 one PO at a time to determine (1) if each PO was suited to a distributed approach, and (2) the minimum media requirements for effective distribution of instruction for each PO. The suggested modification would remove the emphasis from the individual POs and place it on the instructional content overall. It was in fact suggested that for users to obtain the clearest possible picture of the instructional content of the program (so that they might determine its suitability for distributed training and identify its media requirements), they should construct instructional scalars similar to those constructed by design teams at CF schools. (For an existing course a scalar should have been constructed and should be available).

When a program design team at a school is handed a Training Standard (TS) its first major task is to develop an instructional scalar (the US military calls it a "hierarchical chart") based on the POs contained in that TS. The scalar displays all the task elements of the POs for which instruction must be provided. After reviewing the specifications and the TS for the program the design team proceeds to break down each PO into its task elements, i.e., all the "bits" of skill, knowledge and attitude a trainee must master in order to achieve the PO. Team members usually do this by writing all the task elements they can identify on index cards. Two or more members of the team do this separately so as not to be influenced by each other's selections, and they then compare notes adding and deleting as necessary to ensure that all necessary elements (and only those that are necessary) are identified. The task elements are then grouped and sequenced and displayed graphically on a large flat surface according to (1) the order in which they

are performed on the job, (2) the sequence dictated by the inherent logic of the subject matter, and/or (3) a sequence based on ease of learning. Subordinate skill, knowledge and attitude elements are added and the content and sequence are revised by team members until they arrive at consensus. The scalar now displays, in super- and sub-ordinated relationships, instructional content down to Teaching Point (TP) level. For the purposes of Sections 1 and 2 such a scalar provides the clearest picture of program content. It is, therefore, not necessary to produce EOs from the scalar as the initial version of Section 1 had required; and referring to the scalar is far more efficient for the purposes of Section 2 than working through the section one PO at a time, as had originally been required. This major structural and procedural change substantially improved the efficiency and usefulness of the model.

CF respondents pointed out that a recent change in training policy will soon result in the combining of courses conducted at central schools and on-job training into a single training "program". Although this change did not affect the design and structure of the model (apart from the fact that all references to "course" in the initial version had to be changed to read "program") it may significantly affect the way it is used. At present a delicate balance is maintained between the amount of time trainees spend on a course and the time they spend training on the job. Too much time on course delays their posting to an operational unit and gainful employment. On the other hand arriving at their unit too soon increases the amount of training that must be provided on the job by hard-pressed operational supervisors. The nature of the POs involved also affects the way in which training is currently divided between central school and the job site. At present, on-job

training consists of POs that include tasks involving only a minimal increase in knowledge or skill, are performed rarely or at a few locations, and/or are performed largely by reference to job aids or check lists. Courses consist of POs which include tasks that are essential to job performance, are encountered at the majority of employment locations, have a high degree of procedural standardization and technical skill, and/or involve significant dangers to individuals. Prior to the policy change only courses conducted at central schools would have been considered for the distributed approach. With the new policy, however, the entire program will be considered and it may well be possible to conduct the portion that has always been instructed at central schools, as well as the portion conducted on the job, at trainees' home units. Training actually conducted on the job may itself be delivered by employing the techniques and technology of the distributed approach (for example, instructional material could be delivered by computer or video-cassette with the trainees' supervisors at the work site providing tutorial assistance). In general it seems likely that the overall effect of the new policy will be to increase the feasibility and desirability of distributing training for most programs (or portions of those programs).

Clearly, the expert review process was extremely valuable. The advice provided by the respondents contributed to a final version of the model that is more "user friendly" than the initial version and to notes which more precisely amplify and clarify the factors it presents. It was particularly useful to involve experts from two distinct environments--military and academic. Although they all brought their own unique perspectives to the study, most of their comments on improving the model (and notes) supported each other.

Predictably, the military respondents provided feedback which could only be expected from serving members of the CF and helped to make the model more useful to CF trainers.

**Implications for Further Study**

Because limitations were imposed on the scope of the study, not all the comments and suggestions provided by the expert respondents were incorporated into the model even though it was recognized that to do so would have increased its validity and usefulness. Some comments aimed at (a) expanding the scope of the model itself, and (b) situating the model within the broader context of CF training were not incorporated into the model but will be the subject of further study. For example, the media selection sequence of the model will be reviewed periodically to take into account new technologies being developed for education and training such as multi-media and artificial intelligence.

The algorithmic nature of the model imposed limitations on it that will also be the subject of further study. One of the difficulties the author experienced in developing the model was that of representing in an algorithm, the many layers and/or loops of information which should be considered in deciding whether or not to use the distributed approach. Although the notes which accompany the model are intended to fill in any informational gaps which may exist when using the model, the fact remains that an algorithm is linear in nature and the model is limited by this linearity. Having said that, however, it is essential to keep in mind that this decision model is presented as a tool for CF trainers to use when deciding on the use of the distributed approach to training. It is

not a rigorous procedure which, when followed, will lead to a definite "go" or "no go" decision. It is a source of guidance in making that decision. Each user of the model will bring to the decision-making process, factors for consideration which are unique--to the specific program, to the specific school, perhaps even to the specific command.

However, further enriching of the algorithm could be accomplished by computerizing it in some form to permit parallel processing of information (providing "yes", "no" and "maybe" options within the algorithm). In that way, there could be greater flexibility in terms of information feeding forward from one block to the next. It would, however, require considerable effort to develop the decision rules by which the more complex data could be evaluated.

The CF respondents considered the model adequate to address issues related to the training program, the trainees and training support; however, they noted that additional aspects contribute equally to the decision to distribute a given CF training program. They pointed out that these include:

a. **Costs:** While costs are covered in the "Final Considerations", the decision-maker must pay much more attention to this area. For each category mentioned, up-front, start-up (or implementation) costs must be detailed, resource requirements identified, and life-cycle costs (for upgrades, updates or modifications) must be estimated. Further, the availability of these resources must be determined and earmarked;

b. **Management Issues:** Distributed training requires significantly different management protocols, particularly in a complex organization like the CF.

Protocols for student management/control must be defined, agreed to and promulgated; courseware, hardware (in the case of technology) and program configuration management must be established and implemented; responsibilities and functions must be delineated and assigned; and

c. **Impact:** The impact of distributing training programs on the receiving sites, other systems (such as pay, postings, career management, financial information, etc.) and organizational structure (such as establishing a centre of expertise to manage large/complex programs) must be assessed. In some cases, the impact would cancel out any gains from distributed training.

These broader issues would have to be addressed before CF trainers were given the decision model to assist them in selecting the distributed approach to training.

**Recommendations**

It is recommended that: the decision model be used by CF trainers in determining the suitability of a program or portion of a program for the distrbuted approach; and that further development of the decision model be carried out to ensure it provides detailed development/production and cost/benefit analysis sections.

**Conclusion**

The CF has not been reluctant to adopt innovative measures in an attempt to meet the demand for trained people. However, it is a relatively small organization with severely limited resources. Before introducing a new approach to training, managers

must be reasonably sure that sufficient and appropriate resources can be made available to ensure its success, and that the "performance payback" will justify their investment in it. Introducing and attempting to implement an innovative training program without due consideration of all the factors involved puts both the training program itself and the innovative approach employed in jeopardy. The decision model will assist CF trainers in selecting the distributed approach to training for those programs, and only those programs, for which such an approach is feasible and desirable.

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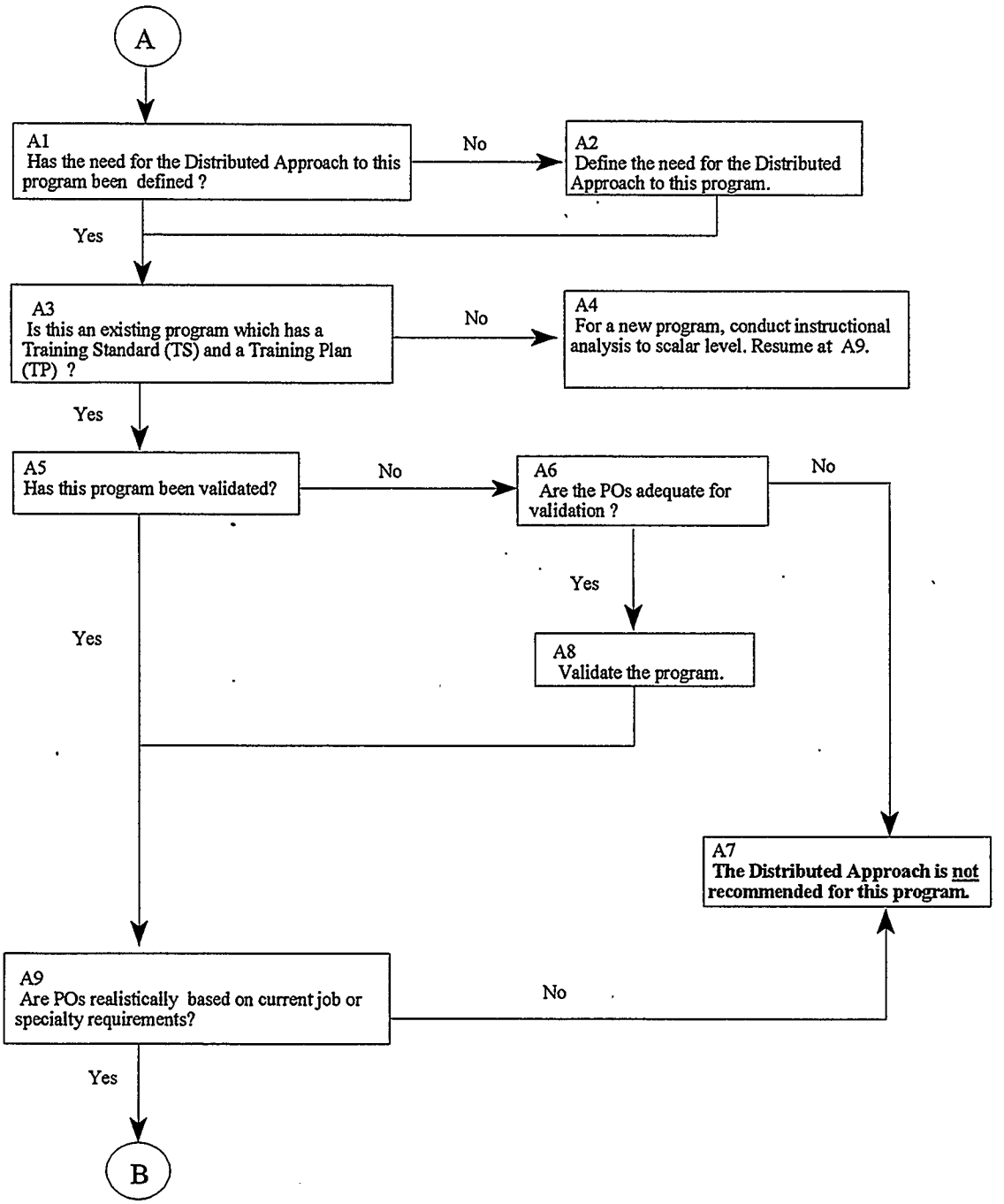
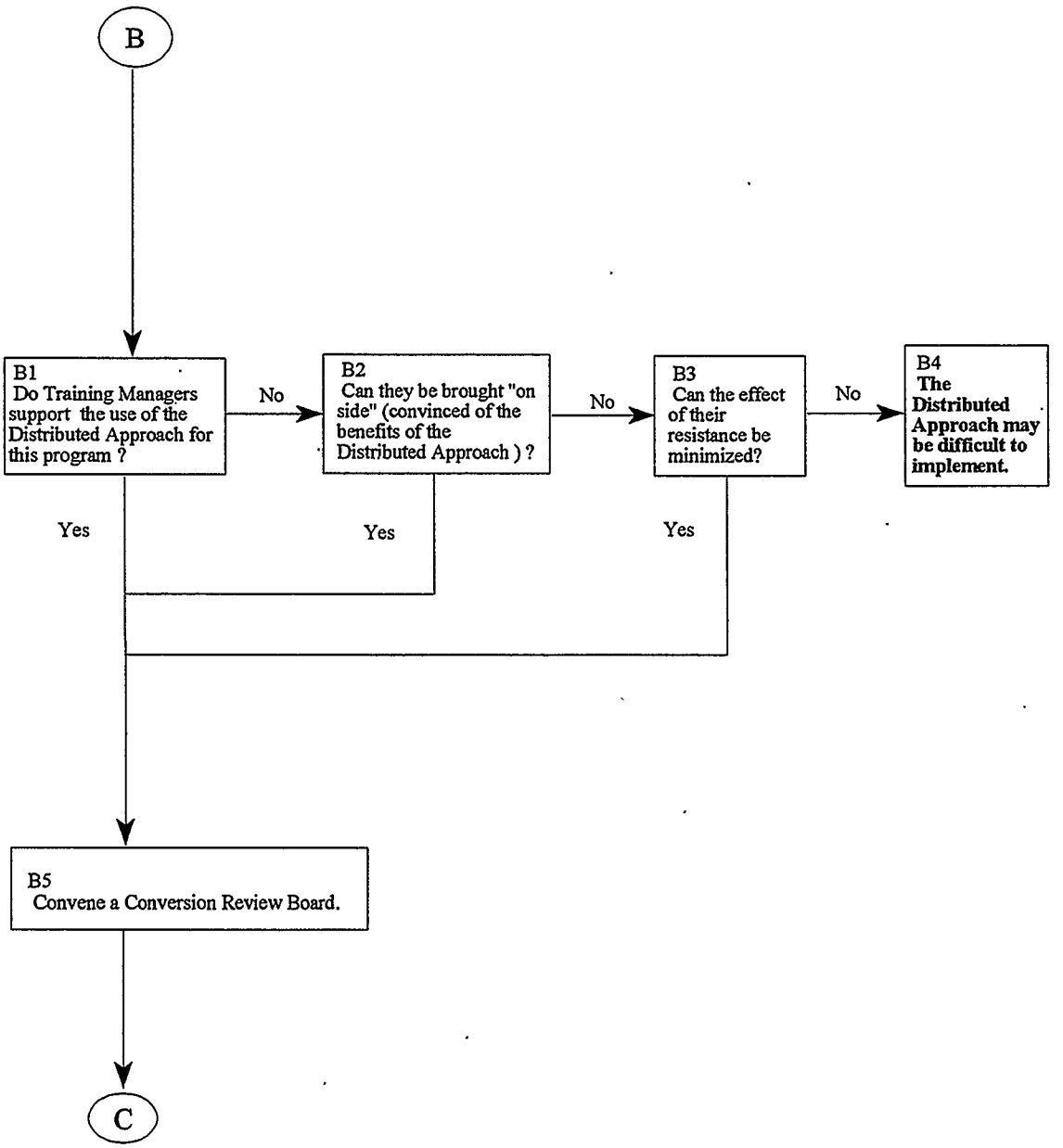
# APPENDIX A:

# REVISED DECISION-MODEL AND NOTES

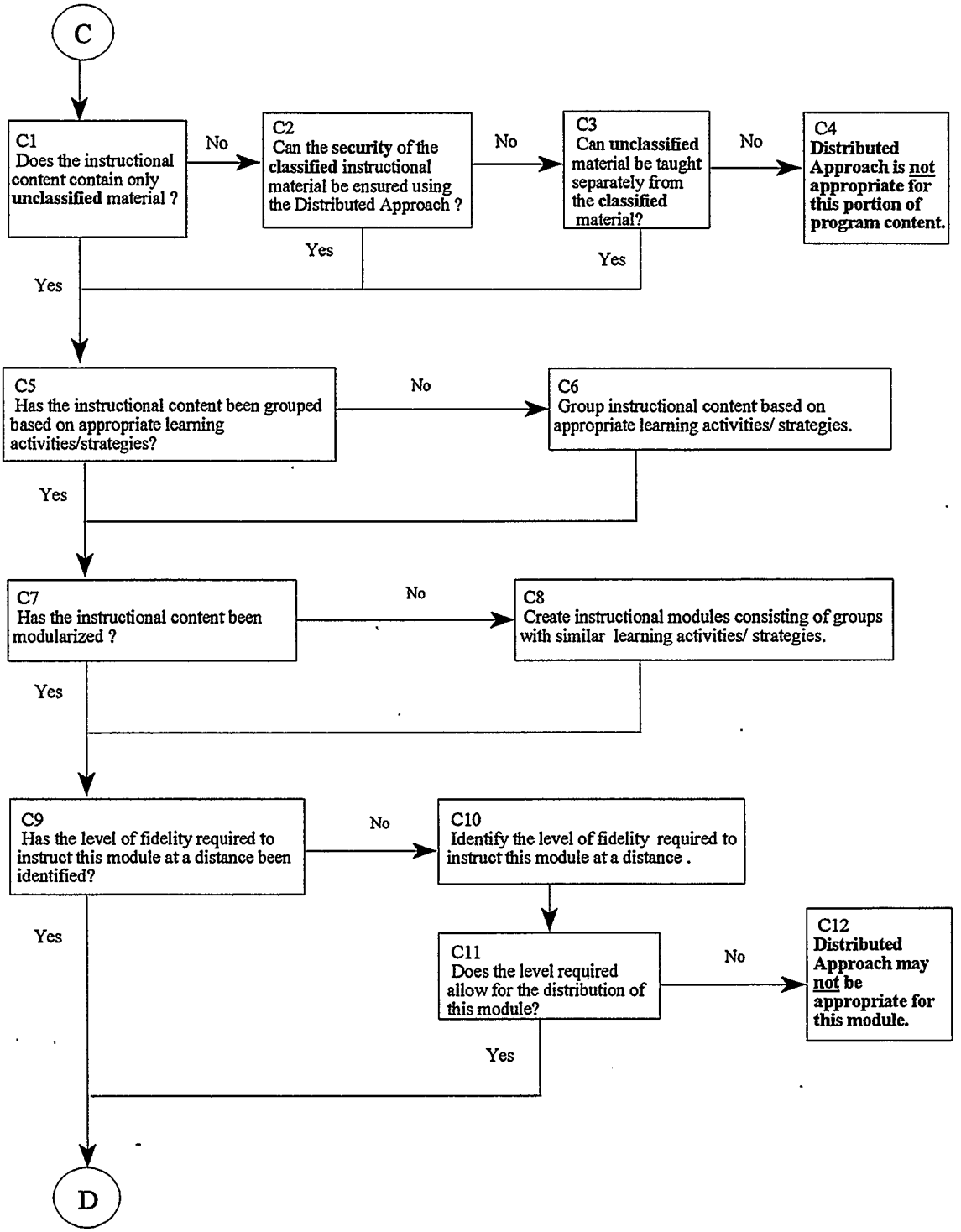
Figure 3: Distributed Training Decision-Model

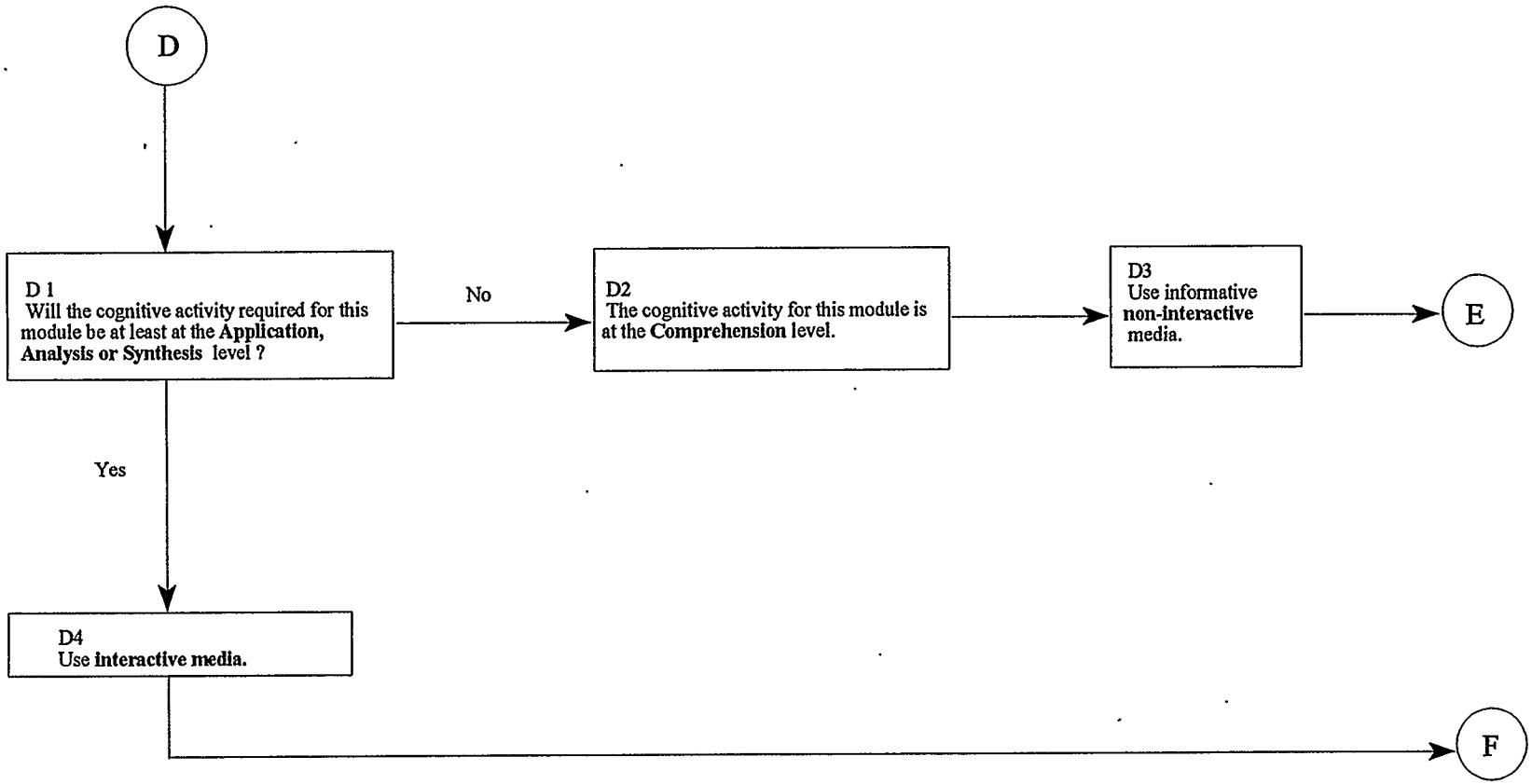
## SECTION 1: Preliminary Considerations

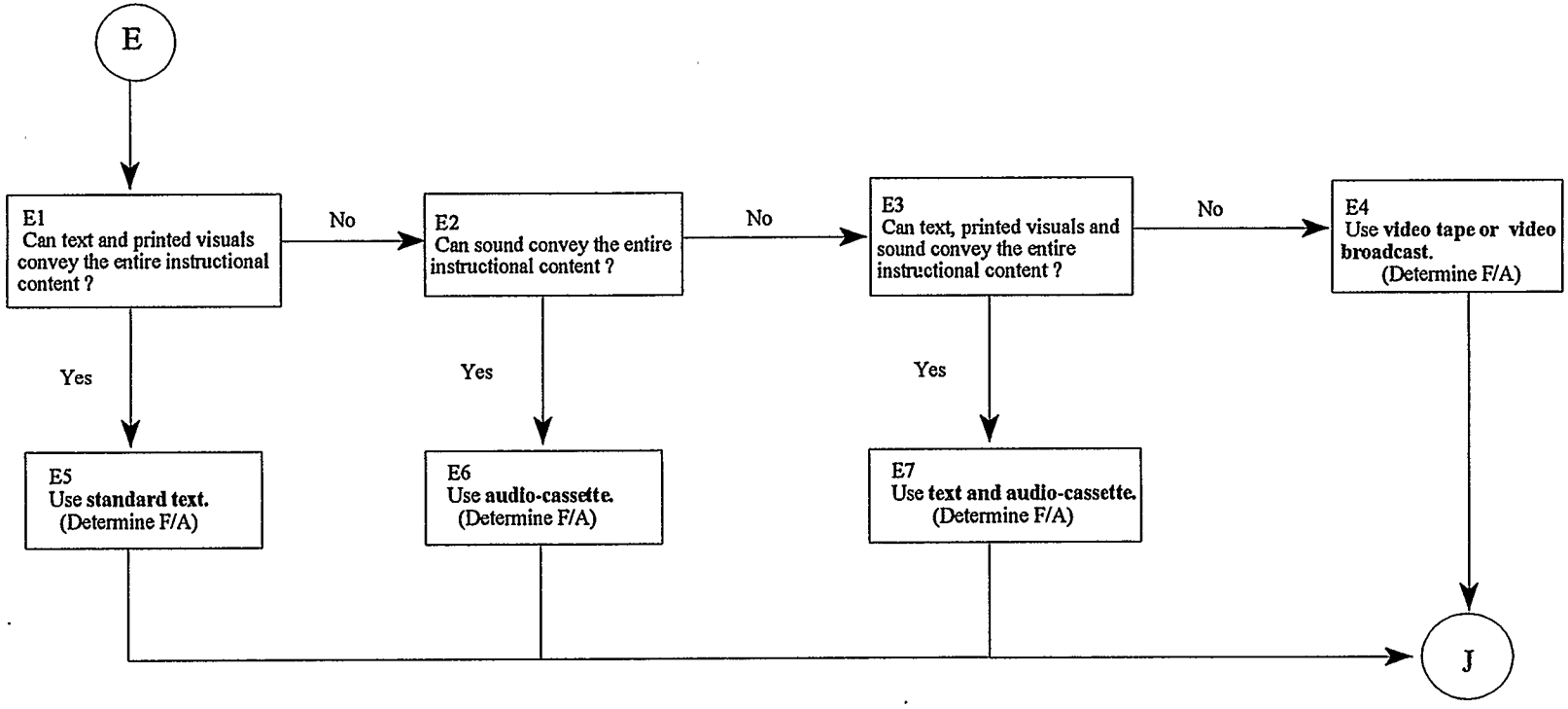


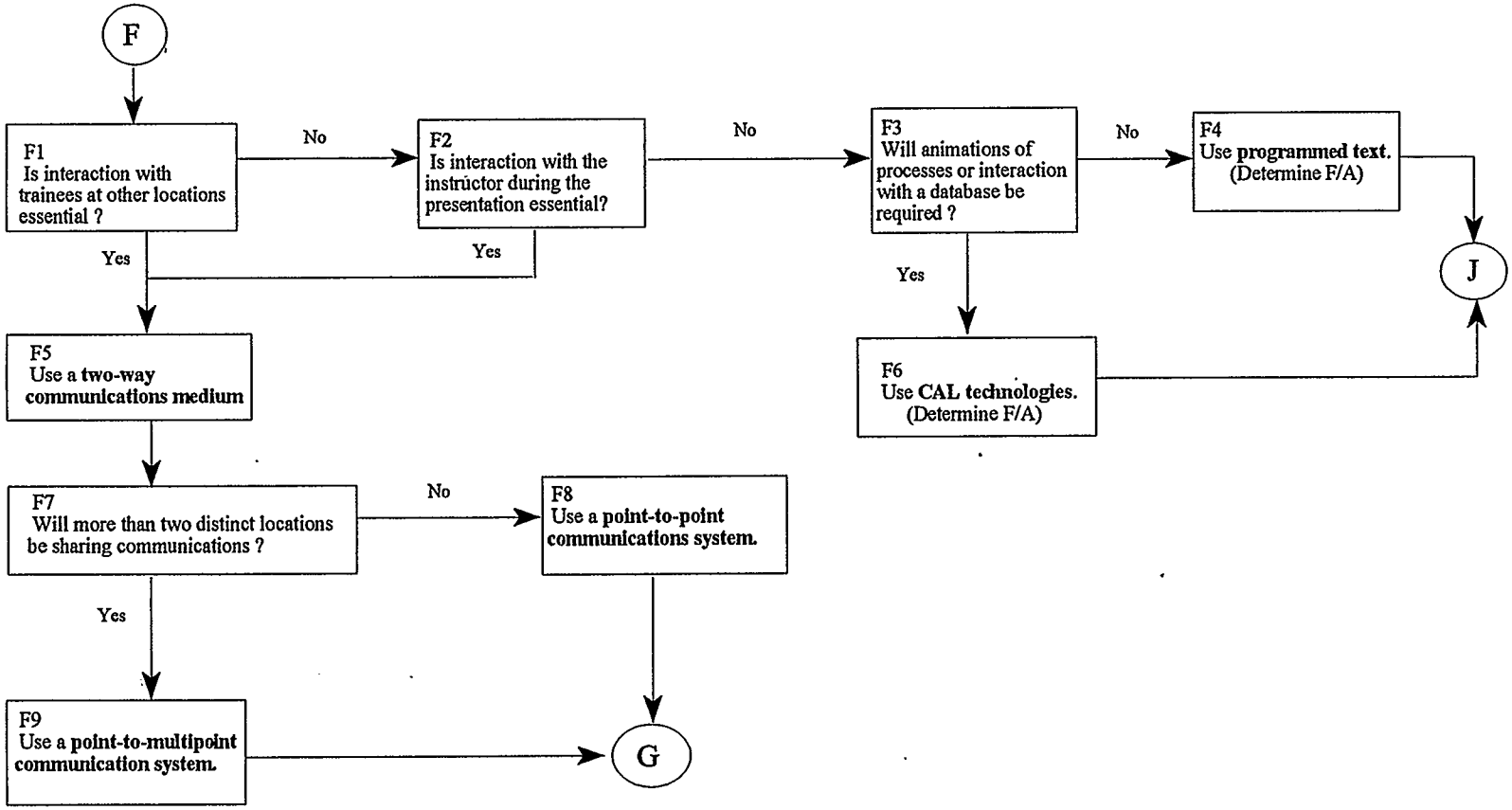

B
B1
Do Training Managers support the use of the Distributed Approach for this program ?
No
B2
Can they be brought "on side" (convinced of the benefits of the Distributed Approach ) ?
No
B3
Can the effect of their resistance be minimized?
No
B4
The Distributed Approach may be difficult to implement.
Yes
Yes
Yes
B5
Convene a Conversion Review Board.
C

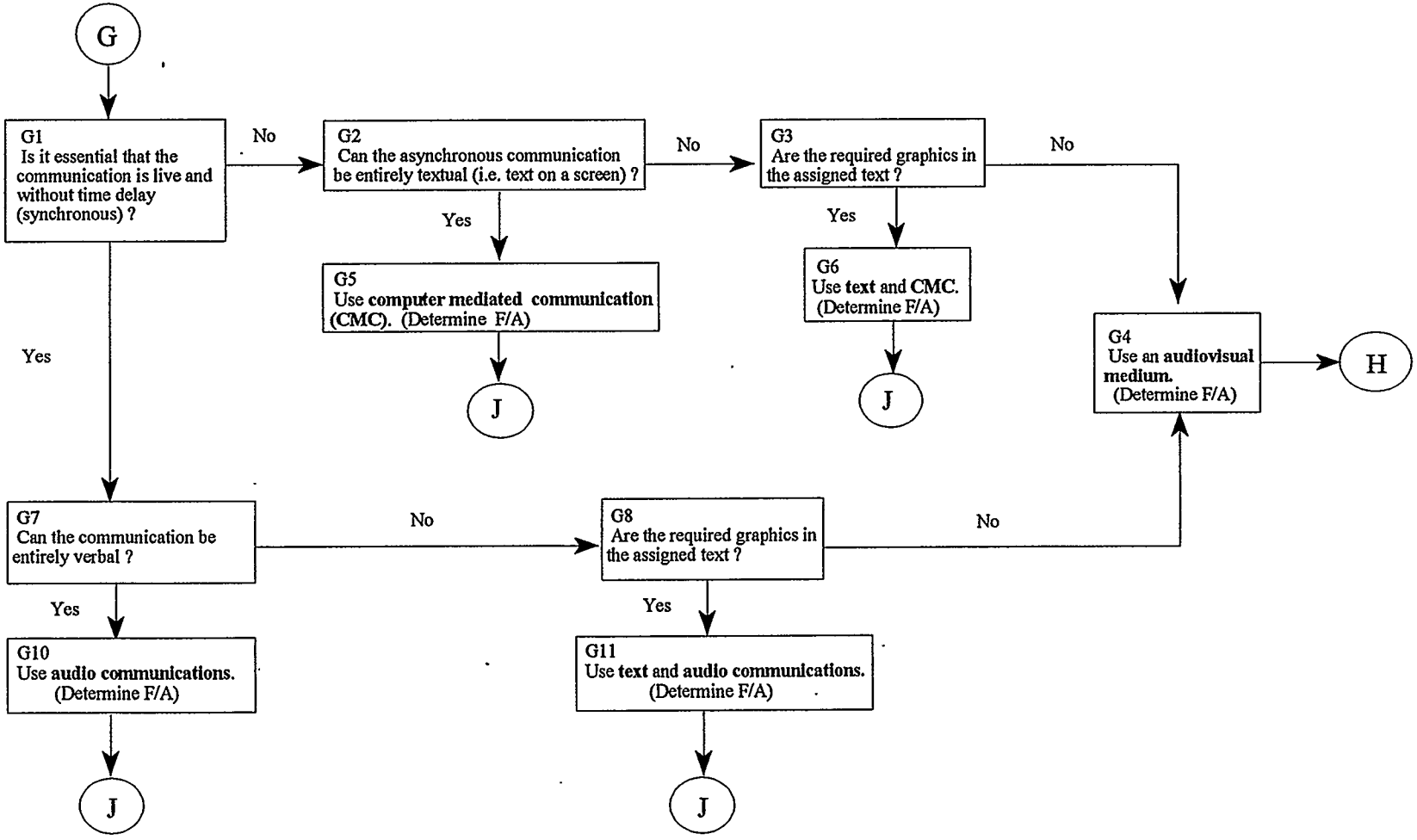
## SECTION 2: The Instructional Content

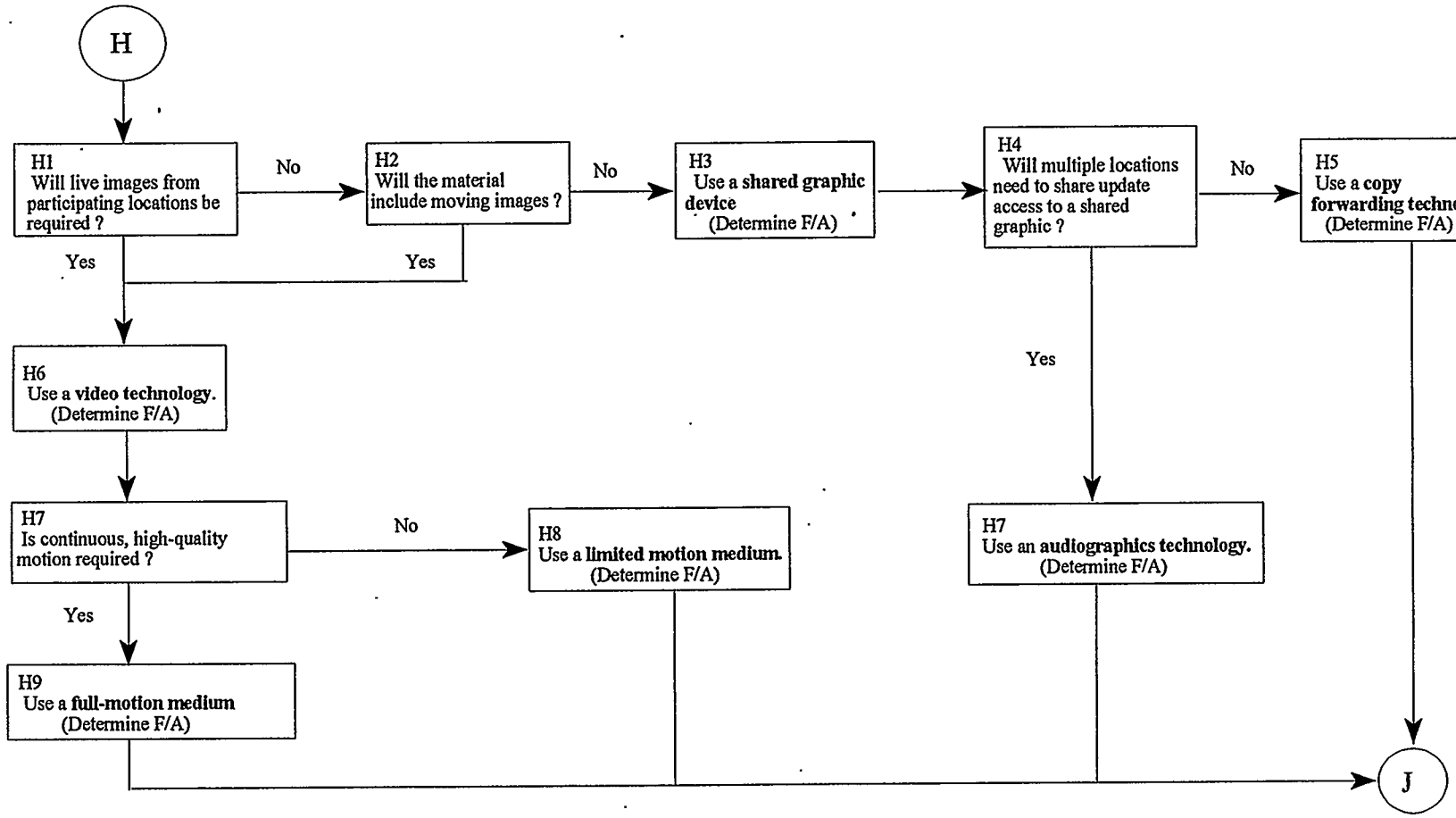



D
D 1
Will the cognitive activity required for this module be at least at the Application, Analysis or Synthesis level ?
No
D2
The cognitive activity for this module is at the Comprehension level.
D3
Use informative non-interactive media.
E
Yes
D4
Use interactive media.
F

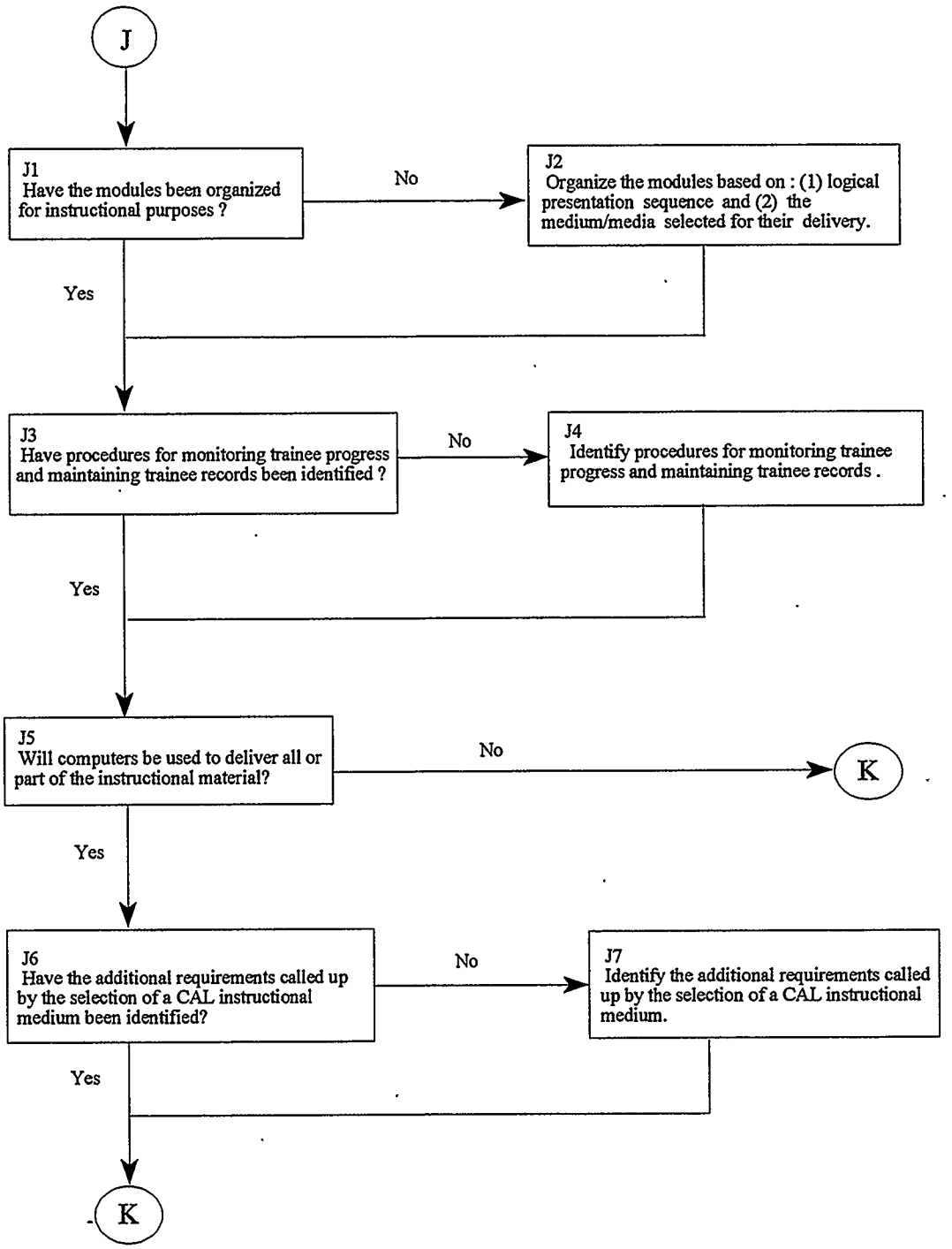

E
E1
Can text and printed visuals convey the entire instructional content ?
No
E2
Can sound convey the entire instructional content ?
No
E3
Can text, printed visuals and sound convey the entire instructional content ?
No
E4
Use video tape or video broadcast.
(Determine F/A)
Yes
Yes
Yes
E5
Use standard text.
(Determine F/A)
E6
Use audio-cassette.
(Determine F/A)
E7
Use text and audio-cassette.
(Determine F/A)
J


F
F1
Is interaction with trainees at other locations essential ?
No
F2
Is interaction with the instructor during the presentation essential?
No
F3
Will animations of processes or interaction with a database be required ?
No
F4
Use programmed text.
(Determine F/A)
J
Yes
Yes
Yes
F5
Use a two-way communications medium
F6
Use CAL technologies.
(Determine F/A)
F7
Will more than two distinct locations be sharing communications ?
No
F8
Use a point-to-point communications system.
Yes
F9
Use a point-to-multipoint communication system.
G

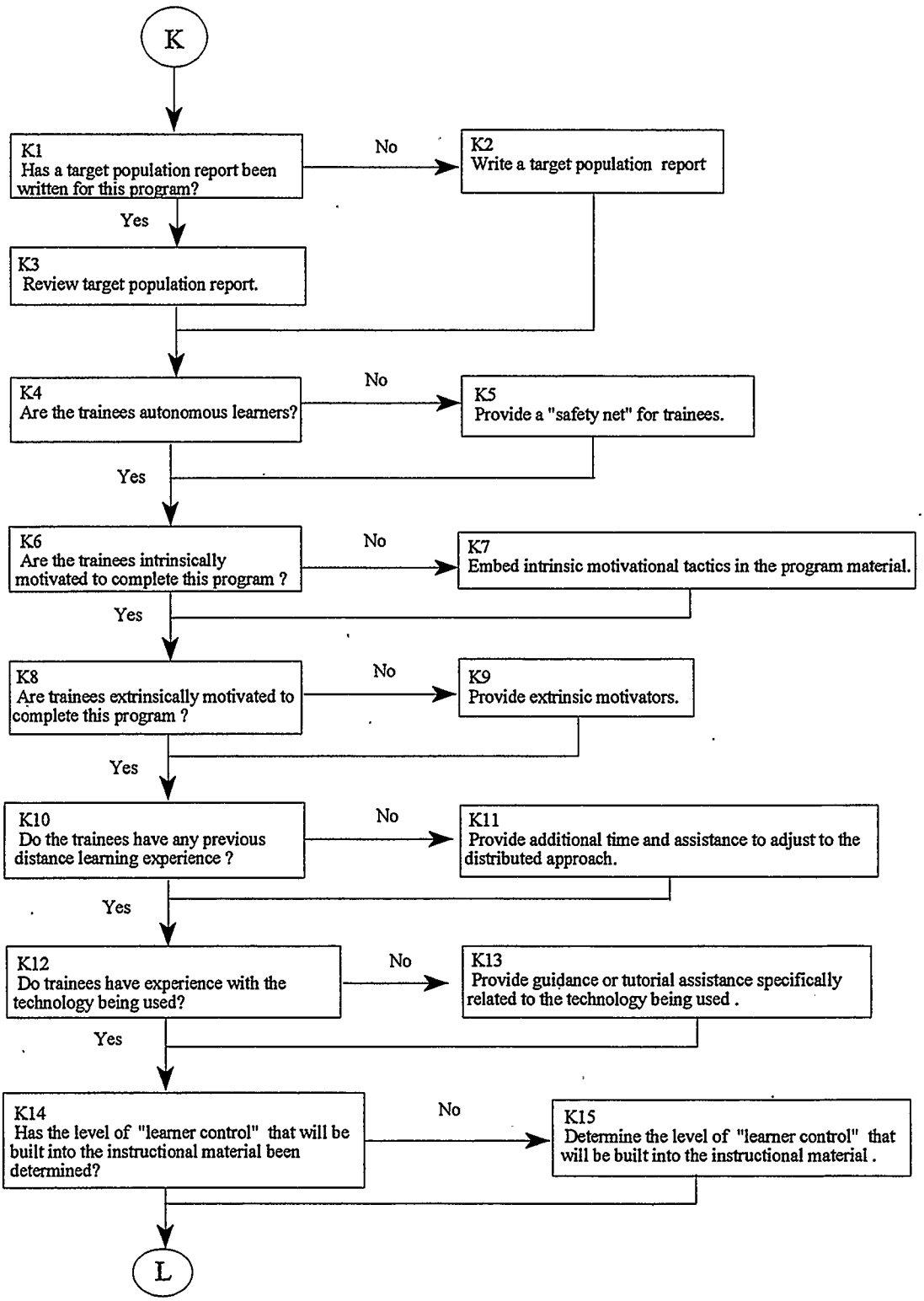

G
G1
Is it essential that the communication is live and without time delay (synchronous) ?
No
G2
Can the asynchronous communication be entirely textual (i.e. text on a screen) ?
No
G3
Are the required graphics in the assigned text ?
No
Yes
G5
Use computer mediated communication (CMC). (Determine F/A)
Yes
G6
Use text and CMC.
(Determine F/A)
J
J
G4
Use an audiovisual medium.
(Determine F/A)
H
Yes
G7
Can the communication be entirely verbal ?
No
G8
Are the required graphics in the assigned text ?
No
Yes
Yes
G10
Use audio communications.
(Determine F/A)
G11
Use text and audio communications.
(Determine F/A)
J
J


H
H1
Will live images from participating locations be required ?
No
H2
Will the material include moving images ?
No
H3
Use a shared graphic device
(Determine F/A)
H4
Will multiple locations need to share update access to a shared graphic ?
No
H5
Use a copy forwarding technology
(Determine F/A)
Yes
Yes
Yes
H6
Use a video technology.
(Determine F/A)
H7
Is continuous, high-quality motion required ?
No
H8
Use a limited motion medium.
(Determine F/A)
H7
Use an audiographics technology.
(Determine F/A)
Yes
H9
Use a full-motion medium
(Determine F/A)
J

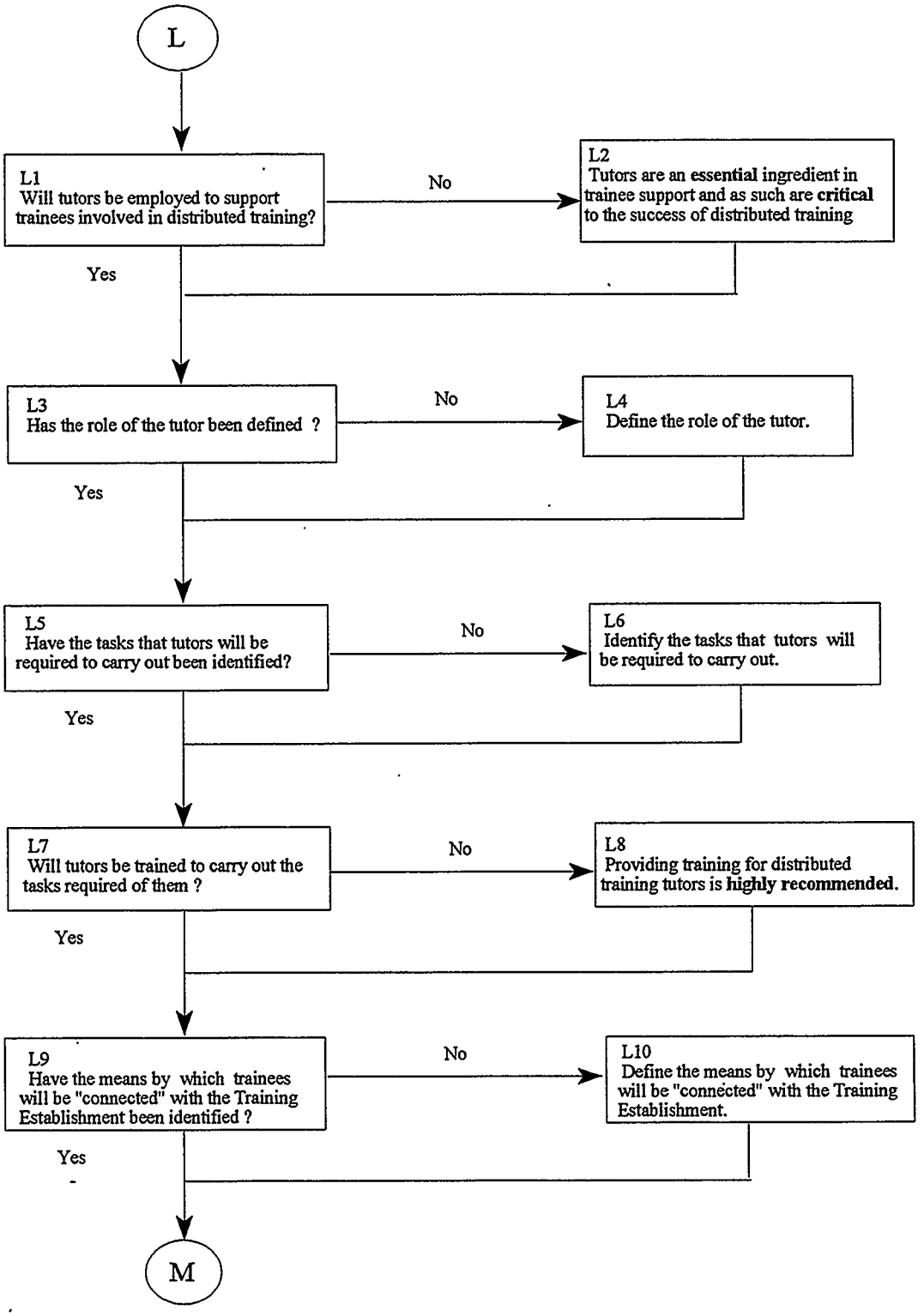
## SECTION 3: The Program



## SECTION 4: The Trainees



## SECTION 5: Trainee Support



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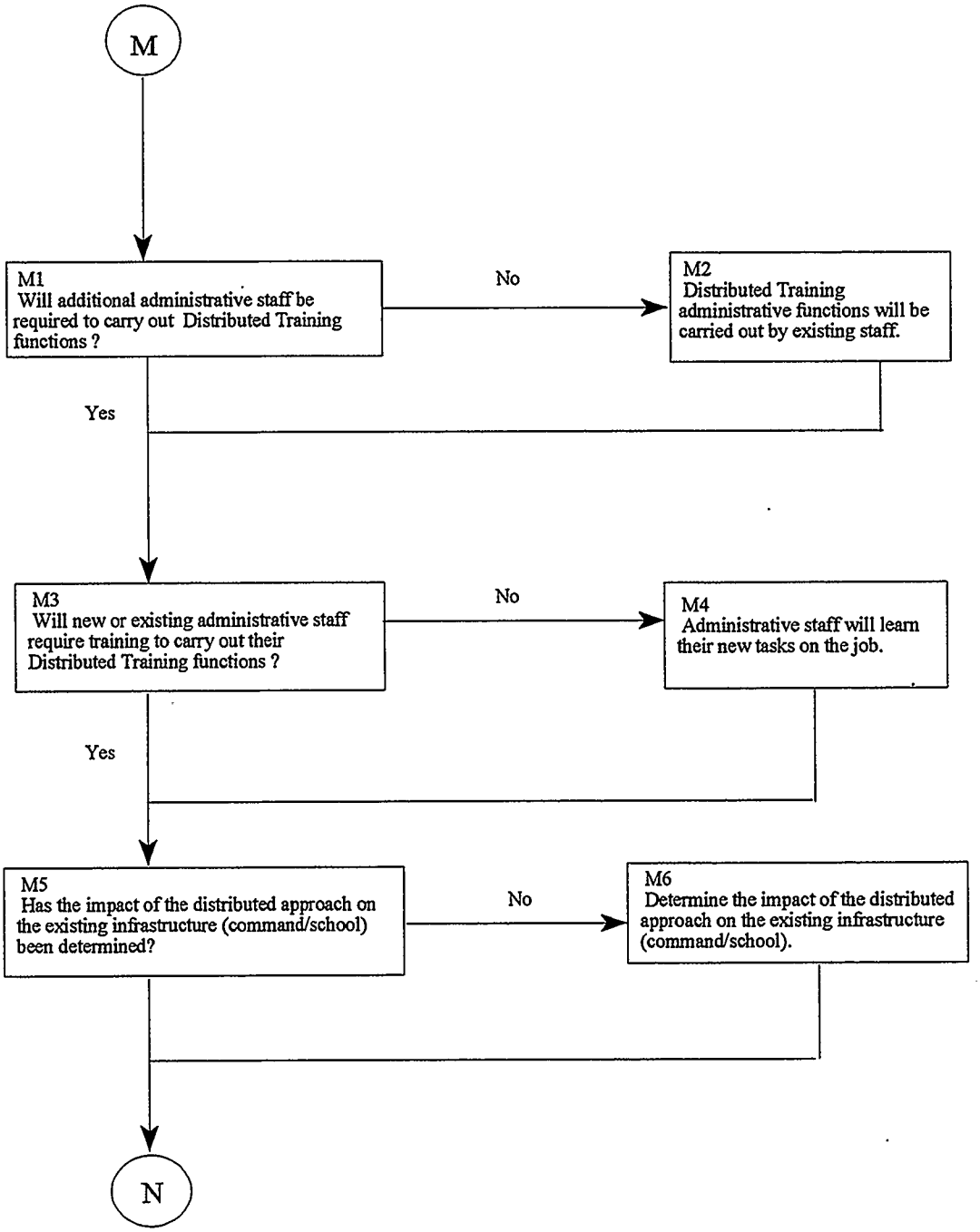

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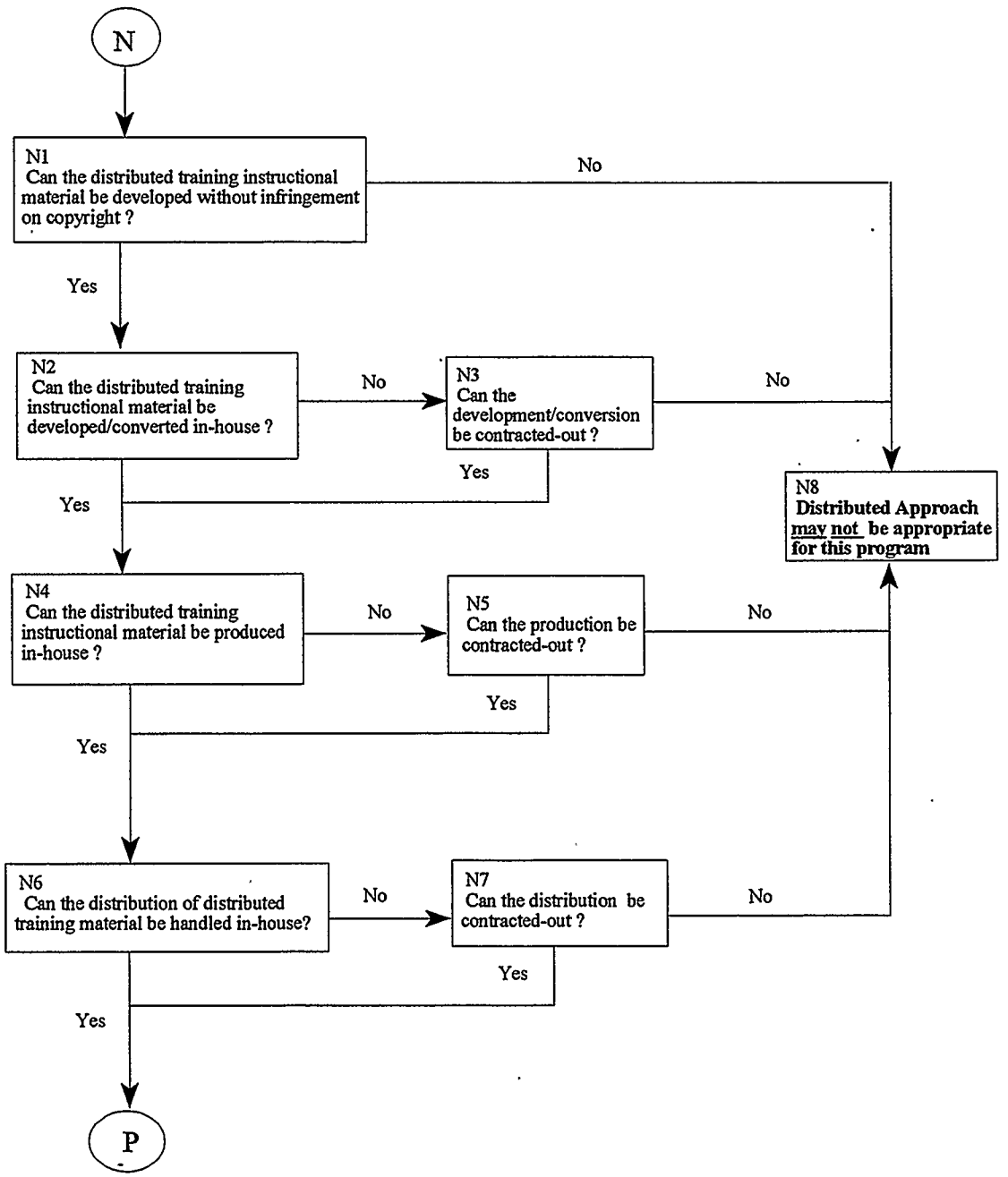
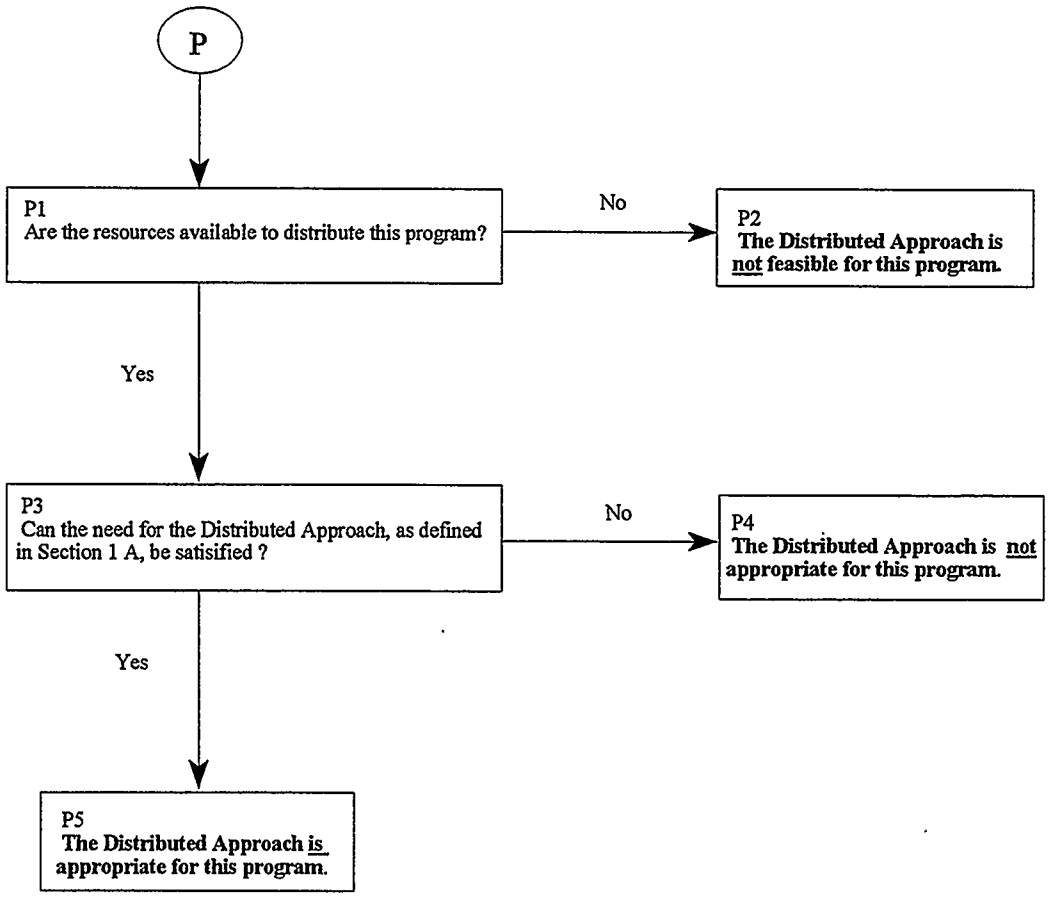


## SECTION 8: Final Considerations



## NOTES

### SECTION 1: Preliminary Considerations

**A1, A2:** You should define the need for a distributed approach to training for this program at the outset. Why is it undesirable to conduct this program in a classroom at a central school? What would be gained by converting to a distributed approach? You might, for example, feel justified in selecting distributed training if you are satisfied that it will:

- increase cost-effectiveness by reducing or eliminating travel and accommodation expenses;
- provide training that over-tasked central schools cannot provide;
- provide 'just-in-time' training that central schools cannot provide due to course loading and scheduling limitations;
- increase efficiency and effectiveness of training by allowing trainees to practice and perform tasks under real-life conditions; and/or
- provide training opportunity not otherwise readily available due to dispersed numbers of trainees or personal circumstances of trainees that make it difficult for them to get to a centralized school.

If you cannot define the need, a distributed approach for this program is not recommended.

**A3, A4:** Unless the CFITS analysis and design processes are carried out to include,

at least, instructional analysis to the teaching point (TP) level, there is no satisfactory way to determine the feasibility and desirability of employing a distributed approach to this program. Instructional analysis will provide you with a clear picture of the instructional content being considered for distribution. Without a clear picture of what is to be taught it is not possible, for example, to estimate resource requirements (personnel, facilities, equipment, materials), determine media requirements, or identify instructional methodology.

The model is intended to be used for both new and existing programs. If a program is new, analysis and design must be carried out as described above. If the program is up and running an instructional analysis will have been completed and Performance Objectives (POs), Enabling Objectives (EOs) and TPs will be available for review. An *instructional scalar* may also be available and, if it is, you should use it.

When a program design team is handed a Training Standard (TS) its first major task is to develop an instructional scalar based on the POs contained in that TS. The scalar displays all the task elements that must be instructed to enable the trainee to achieve the objective. If a scalar has been produced and is available you should use it to obtain a clear picture of the program content. If one is not available you are urged to produce one. Assistance and guidance in producing a scalar can be obtained from a training development officer (TDO) or from Volume 8 of the 9000 series. A brief description of the way in which a scalar is produced follows:

After reviewing the specifications and the TS for the program the design team proceeds to break down each PO into its task elements, i.e.,all the "bits" of skill and

knowledge a trainee must master in order to achieve the PO. This is done by writing all the task elements the design team can identify on index cards. Two or more members of the team will do this separately so as not to be influenced by each other's selections, and they then compare notes, adding and deleting as necessary to ensure that all necessary elements are identified. The task elements are then grouped and sequenced and displayed graphically on a large flat surface according to: the order in which they are performed on the job; the sequence dictated by the inherent logic of the subject matter; and/or a sequence based on ease of learning. Subordinate skill, knowledge and attitudinal elements are added and the content and sequence are revised by team members until they arrive at consensus. The scalar now displays, in super- and sub-ordinated relationships, instructional content down to TP level. For your purposes it provides the clearest picture of program content.

**A5:** Converting from classroom instruction to a distributed approach will probably involve significant initial expenditures that will be recovered over the long term as the cost benefits of distribution are realized. For these benefits to be realized, however, it is essential for programs to be validated to ensure that their objectives are based realistically on job requirements. There is little point in spending money on converting training which is not currently meeting the needs of operational commanders.

**A6, A7, A8:** If the POs do not reflect program content or adequately define what the trainees must achieve, this program cannot be validated in a satisfactory way. The POs

must either be amended in-house (not a recommended CFITS practice), a Standards Board convened, or an occupational analysis requested. In any event, until this program is validated, the distributed approach is not recommended.

**A9:** If this is an existing program, you should refer to the validation study to answer this question. If the program has not been validated, and if its POs are sound, a validation study should be conducted. If this is a new program, you should refer to the needs/occupational analysis reports to determine whether or not POs are realistically based on current job or specialty requirements.

If you know or suspect that the requirement for the program is short-term, you should assess its suitability for distribution primarily in terms of cost-effectiveness. Although the requirement is short term, the "performance payback" may justify the expense of adopting or converting to a distributed approach if, for example, a large number of trainees need the training, the central school cannot provide it, and/or the tasks for which training is required are important or dangerous. In fact, if such conditions exist they may even over-ride the usual requirement for cost-effectiveness.

**B2, B3:** As with any innovation or change in the accustomed way of doing things, some training managers may resist, or be reluctant to support, the distributed approach. It can only be suggested here that such training managers will make it difficult to implement a distributed approach successfully and that a determined and concerted effort must be made to convince them of its benefits and to secure their commitment to it. If

such commitment cannot be secured, it may be necessary to consider an administrative solution to eliminate or minimize the harmful effect of a training manager's resistance.

**B5:** At this point a Conversion Review Board should meet to decide if it is feasible and desirable to employ a distributed training approach to this program. All the factors presented in this model should be considered.

## SECTION 2: The Instructional Content

**C1, C2, C3:** The "classified material" aspect of each PO and of the program as a whole is one factor that might well require a design, administrative or security-oriented solution if the distributed approach is to be recommended.

**C5, C6:** The content of any training program will usually include material belonging to any or all of the three learning domains--cognitive (primarily intellectual *knowledge* and *skills*), psychomotor (primarily *physical skills*) and affective (primarily *feelings, attitudes* and *values*). You should identify learning activities/strategies which would allow the best possible presentation of the instructional content and then group the content based on similar learning activities.

**C7, C8:** You should now organize similar content groups into modules. These modules will be the units of instruction which trainees of distributed training will be required to

complete. You will have to determine the size of module most appropriate to the overall structure of the program and to the circumstances of the trainees participating in the program (e.g. if the trainees are full-time or part-time participants).

Modularization is defined as the breaking up of instructional content and learning activities into smaller, more manageable "chunks", based on length or function, to facilitate individualized instruction. Modularization can be achieved in various ways: pages or screens can be designed so that they convey a single idea or principle; units can be designed to consist of the smallest number of pages or screens that are needed to teach a single concept or procedure; modules may be organized according to instructional functions, (e.g., main concept, example, help, practice, feedback, test, etc.). Modules can also be developed, for help or remediation, which are seen only when needed. (The capability to individualize instruction in this manner normally requires some form of computer control to work effectively).

Modularization of instructional materials is particularly important for trainees of the Reserve Component. Typically, a Reservist has limited time available to undergo training. Modularizing instructional materials not only allows the Reservist a chance to complete a recognizable portion of a program, but also provides the Training Establishment with a means of tracking the trainee's progress. Another benefit of modularization is that it increases the intrinsic motivation of materials and programs. Because the content is organized into small "chunks", the trainee can get a better, more immediate sense of accomplishment and progress than if it is organized as a long, single unit. As well, there is likely to be less fatigue and boredom created by a number of small

units that allow the trainee frequent breaks.

**C9, C10, C11, C12:** Some of the modules you are considering for distribution may require special equipment, facilities and/or environments (in the field; at sea; etc.) in order for the module to be instructed effectively. It is essential to determine if these special requirements can be met if the module is distributed away from the central school/ training area. If the special requirements cannot be provided in a distributed training situation, then the distributed approach is likely not appropriate for the modules and they should be included in another portion of the training program (i.e. on-job-training; out-service training). Determining the fidelity requirements of program modules will help you to decide whether they are suited to the distributed training portion of the program.

The term fidelity is used as a kind of shorthand to describe the degree to which a simulation corresponds to the "real thing." Before identifying the level of fidelity required to train a module effectively, you must identify the aspect of the module that is going to be simulated. Will you be concerned with how closely you can simulate the hardware (does it look like and operate like the actual equipment)? Will you be concerned with simulating the "situation" (threats, terrain, communications and information flows, motion, noise, heat, cold)? And so forth.

Sometimes all the fidelity you can afford is not good enough. At other times, however, all the fidelity you can afford may be more than you need for optimum training. At the early stages in the learning process trainees are likely to be confused by the full complexity of, for example, a weapon system they are learning to operate or maintain.

They are more likely to learn better and faster if presented with simplified representations that are sufficient to get across the idea to be learned, but from which the distractions and complexities of the actual weapon system have been eliminated. Thus, in designing training, the fact that resources provide maximum fidelity should not be the sole basis for their selection. Resources that provide less fidelity might be at least as effective. Moreover, such resources will usually be less expensive. Training design should always *optimise* cost-effectiveness.

Training conducted at central schools simulates real-life conditions to the extent necessary to make it effective. However, on occasion there is a significant gap between what the trainees are required to perform at the school under simulated conditions (to demonstrate achievement of a PO), and what they will be required to perform on the job under real-life conditions. On such occasions a training "limitation" is declared for that PO, a limitation that must be removed by further training on the job. Such a limitation may still be a factor to be acknowledged when the POs are instructed away from the central school; it is possible, however, that trainees will be able to achieve a given PO at their home units under real life-conditions and with actual equipment, making it unnecessary to declare a training limitation for that PO.

It is quite possible that, after completing Section 2, you will judge all modules to be suited to the distributed approach, and will therefore feel justified in selecting a distributed approach to the entire program (providing consideration of the factors in all the other sections reveals nothing that would preclude distributed training). It is also possible, however, that you will not deem every module suited to the distributed

approach. In that case you will have to make a decision as to how to proceed. Possibilities include: rejecting this program as a candidate for distributed training; omitting or modifying modules unsuited to distribution, conducting part of the program in a central school and distributing the remainder, etc.

Having identified those modules which appear to be appropriate for distribution, you are now ready to select the medium/media most appropriate for the delivery of the instructional material.

**Note:** Sub-sections **D** to **H** present factors you should consider in identifying the media required for trainees to achieve each module efficiently. Identifying media requirements is an essential step in determining whether or not sufficient resources can be made available to make a distributed approach to this program feasible.

**D1, D2, D3, D4:** This model has been designed to allow you to make media selection decisions based on the *interactivity* requirements of the cognitive instructional material. It is one of the most, if not the most, important factors to consider in the design of distributed training. Interactivity is defined as a reciprocal action or *communication* between a trainee and a source of instruction (instructional material or instructor); between trainees and instructors; or among trainees.

The view of interaction taken in this model is that for interaction to occur, communication must be two-way, but it is not essential that the communication take place between two persons. If a medium is capable of providing feedback, and if that feedback

is immediate, constant, explanatory (rather than judgemental), concise and clear, then it is considered to provide interactivity.

The interactivity that is so apparent in the classroom between the trainee and the instructor, and among the trainees, is lost when instruction is taken out of the classroom and presented to individual trainees at a number of different locations. For distributed training to be effective, interactivity must be provided by other means (likely the instructional media or tutors) .

You will be asked, first, to identify the *level of cognitive activity* demanded by the content of the module. Based on your response, you will proceed through one of two paths: one involving interactive media, the other non-interactive media.

The levels referred to in questions D1 and D2 are defined as follows:

Comprehension - This represents the lowest level of understanding. It refers to a type of understanding such that the individual knows what is being communicated and can make use of the material or idea without necessarily being able to relate it to other material or seeing its broader implications. At this level, when something is known and understood, it can be put to use.

Application - The use of general ideas, rules of procedures, generalized methods, or technical principles and theories that must be remembered and applied in new real and specific situations.

Analysis - the breakdown of information into elements or parts such that the relative hierarchy of ideas and/or the relations between the ideas expressed are made clear. Analysis is intended to clarify information by comparing, contrasting,

or distinguishing and reviewing the information itself.

Synthesis - The putting together of elements and parts to form a whole. This involves the process of working with the elements and parts and combining them in such a way as to create a pattern or structure not clearly there before. Synthesis is the mental transformation of information into a new or different structure, design or pattern, or solution.

For the distributed approach to be effective for modules involving cognitive activities at the Application, Analysis and Synthesis levels, some form of interaction must be provided. For modules involving cognitive activity at the Comprehension level, interactivity is not essential.

Later in the model, you will be encouraged to employ tutors to provide support to the trainees of distributed programs, regardless of the media you select for use in the delivery of these programs.

**Note:** Sub-sections **E, F, G** and **H** make up the media selection sequence of the decision-model. As you proceed through this sequence, you will reach blocks which provide you with a medium recommended as the most appropriate for the interactivity requirements of a module or portion of a module. In the same blocks you will see the words "Determine F/A"--meaning determine feasibility and/or availability of the medium. It may be that the medium recommended is too expensive or is simply not available to you and you should make that determination before proceeding any further through the decision-model. If you can afford the medium and it is available to you, then you should proceed

through the decision-model. If the medium is too expensive or unavailable, then you should select a medium which is affordable and available and which is still capable of providing effective distributed instruction. It may be that the affordable and/or available medium provides less interactivity than that provided by the medium recommended in the media selection sequence. If this is the case, you must ensure that the loss of interactivity is compensated for by other means (through contact with tutors, etc.).

**E1, E5:** Standard text is non-interactive. It presents content in a linear fashion, without feedback to the trainee. The trainee reads the material from beginning to end, with no non-linear movement through the text. Print is a familiar, inexpensive and portable medium. Its format allows trainees access to any section, in any order, for any length of time. A print medium can be used without any additional equipment, anytime and anywhere.

**E2, E6:** For the purposes of this model, audio-cassettes are considered non-interactive. Although a trainee can start, stop and replay a cassette tape, it does not provide true interactivity because it provides no feedback to the trainees. As with any prerecorded, learner-controlled media, audio-cassettes allow trainees to control the time of day they study and the speed with which they progress. Flexibility and ease of manipulation may make trainees *feel* they are in control of their learning.

**E3, E4, E7:** If the combination of text, printed visuals and sound is insufficient to

convey the entire instructional content, video medium is recommended. One-way video is non-interactive. One-way video technologies distribute a video signal from a single source to one or many reception sites. Video tape or one-way video broadcast can be used effectively in remote classrooms or local centres where tutors are available to answer trainees' questions and provide feedback on trainees' responses. Video-cassettes may give the trainees a similar sense of control over their learning as was described with audio -cassettes.

**Note:** Standard text, audio and video-cassettes themselves do not provide interactivity. However, when they are delivered as part of a correspondence program, they do acquire a degree of interactivity. If trainees are able to contact a tutor through the mail (asynchronously), or over the telephone (synchronously) then they will be able to discuss the instructional material and receive feedback on their ideas. The biggest disadvantage of correspondence programs delivered through the mail system is the delay between the time questions are asked by trainees and the time they are answered by tutors.

**F1, F2:** In these first questions on the interactive media sequence, you are asked to determine the interactivity requirements of the instructional material.

**F3, F4, F6:** If you answered "no" to F1 and F2, it is recommended that you use one way interactive media such as programmed text or computer-assisted learning (CAL). Programmed text is written in a way that allows trainees to move from one PO to another

based on their performance in the diagnostic portions of the text. As a print medium, it is familiar, relatively inexpensive, portable and can be used anytime and anywhere.

CAL is used in a local "off-line" mode; that is, the computer is used by the individual in an autonomous manner. *Drill and practice* is the simplest function provided through CAL in that the trainee is presented with problems and questions and asked to respond. The trainee gets immediate feedback. In the *tutorial mode,* instructional material is presented and the learning process is guided through interaction. A key feature of the tutorial mode is the feedback system that can provide remedial instruction according to the incorrect responses offered by the trainee. In the *simulation mode,* the trainee is presented with various data and parameters that characterize some realistic situation and is asked to make a series of decisions. Although feedback regarding the consequences of these decisions is given, there is often no categorically right or wrong answer. The interactive capabilities of the computer can be combined with a *laser videodisc* or a *Compact Disc Read-Only-Memory (CD-ROM)* to provide access to stored audio, visual and textual information.

**F5, F7, F8, F9:** If you answered "yes" to F1 and F2, proceed through the two-way communications path. As you do so, you must determine the number of locations from which trainees will be participating. *Point-to-point* communications refers to a signal from a single origin point received by a single receiver. *Point-to-multipoint* communications refers to a signal from a single origin point received by multiple receivers, which is typical of broadcast transmissions such as satellite down links and radio transmissions.

Once the number of locations has been determined you are asked to continue through sub-section G.

**G1, G2:** Synchronous communication between parties is live; it occurs at the same time. Asynchronous communication is not live and it does not occur at the same time; there is a time delay in the communications.

**G3, G5, G6:** Training via computer-mediated communication (CMC) is unique in that it provides some of the features of classroom-based instruction (notably group interactivity) and of distributed training (notably the freedom from time and place constraints). Two of the services available using CMC technologies are: computer conferencing and electronic mail (E-mail). Computer conferencing provides access to instructors and trainees in a group learning situation. Computer conferences can be conducted in short time frames or over a period of days with participants signing on and off at their convenience. E-mail differs from computer conferencing in that it is an individual method of communication. Messages and information may be transmitted between instructor and trainee or between trainee and trainee. Most E-mail systems also have a bulletin board facility that gives multiple read-only access to messages and documents (trainees can leave messages on the bulletin board for all participants to see).

Through these "on-line" communications facilities, trainees can easily contact each other or an instructor, and transfer text and data files to one another, regardless of space or time constraints, from their own homes, local centres or workplaces. Equipment

requirements include: a telephone line, a microcomputer, a modem, and suitable word-processing and communications software.

**G7, G8, G10, G11:** Audio communication requires the use of telephone lines. Telephones offer two-way, interactive communication between two people at two locations; between an instructor and several people at one location; or, through *audio teleconferencing,* between people at a number of different locations.

A combination of *conference call* and *amplified speaker telephone* may also be used for instructing groups of 10 or 12 trainees at one location such as a local centre or support base. Another option is the *desktop audio communications set,* involving a desktop microphone for each trainee and speakers (either for each trainee or shared by several trainees). Desktop microphone/speaker systems usually support one-at-a-time communications, unlike a normal telephone conversation, in which both parties can simultaneously speak and hear each other.

Audio teleconferencing ensures that all participants can hear each other and communicate with each other. An effective audio teleconference is dependent upon the integration of the following key elements: the instructor, the trainees, printed instructional materials, various visuals, site coordinators and the hardware. Hardware requirements include: a wide area telecommunications service to transmit the audio signal; a bridge (the device that interconnects all the telephones from the sites--also the most expensive piece of hardware); a headset or lapel microphone for the instructor; and a speaker and several microphones at each site. Key players in the integration of these resources are a local

teleconference assistant and a bridge operator. The former is responsible for setting up the equipment at the local site, the latter handles all the technical functions and any problems that might arise with the teleconference bridge. Telephone technology is not suitable for mass instruction. To function as an interactive instructional system, there is a finite number of locations that can participate. Telephone instruction can be used effectively in combination with a variety of media (text, video tape, etc.).

**G4, H1, H2:** Audiovisual technologies are divided into two main categories: video and audiographics. The former is characterized by the addition of motion to the instructional materials, the latter by the addition of a graphics capability. To choose between these technologies, you must determine if motion is required for effective instruction.

**H6, H7, H9:** Full motion videoconferencing permits live interaction between distant locations via one-way or two-way video and two-way audio. The system provides visual images similar to broadcast television. Full motion (full bandwidth), two-way video is the most expensive video option. The most common form of videoconferencing is one-way satellite television transmission with terrestrial telephone allowing trainees to call in (voice only) to the broadcast. Videoconferencing can be especially effective in the delivery of current and updated information to specialized groups such as engineers and members of the medical occupations. Videoconferences can be videotaped for those who are unable to participate in the live conference.

**H8:** Limited motion (limited bandwidth) video options are significantly more affordable than full motion. These technologies include *slow scan video,* the *picture phone* and *compressed video.* Slow scan video (slow scan TV) uses a device that transmits and/or receives still video pictures over standard telephone lines. A picture phone is a communication device in which audio is accompanied by regularly updated single frames of video from each end of the line. In compressed video, each conference site transmits and receives audio and limited motion video. Compressed video is far less expensive than full motion.

**H3, H4, H5, H7:** Audiographics technologies include such devices as the telewriter, the electronic blackboard and the electronic tablet. Telewriting in distributed training is comparable to the blackboard and overhead projector in the traditional classroom setting. Telewriting images may be produced by using a light pen to write directly on a television screen or by using a piece of chalk on an electronic blackboard. Telewriters transmit graphic and textual information via telephone lines.

With the electronic tablet, any trainee may write a message on a tablet and it is simultaneously transmitted to all sites. The system may be made fully interactive with trainees adding to the image or creating their own. Both voice and data may be transmitted concurrently over a single line, eliminating both the cost of a second transmission line and an audio delay while data is being transmitted.

Copy forwarding technologies include such devices as the facsimile and the optical scanner. The facsimile system is used to transmit any form of visual information (print

or images) affixed to a piece of paper, reproducing a similar hard copy at remote locations. Information is best transmitted and copied before a teleconference to avoid a delay when the conference begins.

Optical scanners allow the participants, through their computers and modems, to transmit images to one another over telephone lines.

## SECTION 3: The Program

**NOTE:** To this point in the model, you will have examined each module in detail and determined if it is suitable or unsuitable for distribution. You will also have determined, for each module, the minimum media requirements for effective distributed instruction (based on the interactivity requirements of the instructional materials). In this section you will consider requirements for groups of modules and for the program as a whole.

**J1, J2:** Modules should now be organized in such a way as to make the presentation of instructional material as effective and efficient as possible. You should organize the modules first on the basis of their logical presentation sequence (to ensure an effective presentation of material) and second on medium/media selected for their delivery (to ensure an efficient presentation of materials).

**J3, J4:** You must determine the way in which the trainees' records will be maintained and trainees' progress will be monitored. You may want to consider a computer

management system either independently of the instructional media or, if CAL technologies will be used, as a part of the design of the delivery technology. You may wish to leave these responsibilities with the staff of the central school/Training Establishment, or you may wish to place the responsibilities in the hands of the trainees' tutors or on-site supervisors.

**J5, J6, J7:** If the instructional medium/media you have selected is computer based/ mediated, you will likely have to determine the following:

- access control requirements;
- communications/network support requirements;
- computer terminal requirements;
- hardware and software compatibility requirements;
- hardware and software upgradability requirements; and
- the facility change requirements.

## SECTION 4: The Trainees

**K1, K2, K3:** A **target population report** describes the major characteristics of the group of people who will be the trainees on this program. You would expect the description to include educational and training levels, work experience, physical characteristics, anticipated attitudes, age, family background, vocational aptitude, and any other information helpful in deciding what training is required and how it should be

presented. In addition, factors K4, K6, K8, K10 and K12 relate specifically to the distributed approach and should be included in the report. The report is essential in determining the start point of the program.

**K4, K5:** Autonomous learners are those who are comfortable with the concept of absorbing instruction without direct contact with an instructor, interaction with other students, or the pacing and regulation found in a classroom setting. However, a "safety net" should be provided, especially for non-autonomous learners, by ensuring controlled access to an instructor/facilitator/tutor.

**K6, K7:** Intrinsic motivation is provided in the design of the self-study materials by embedding motivational tactics in the program materials. For example, by providing short, simple assignments early in the program to build confidence; ensuring good page or screen design; and modularizing training material.

**K8, K9:** Extrinsic motivation is provided by the determination and concentration of the trainee and by incentives to complete the instruction (e.g., pay increase, promotion, eligibility, etc.).

**K12, K13:** Guidance or tutorial assistance may be provided by tutors or if the medium selected is computer-based it may be included in software that accompanies hardware. It is essential that trainees be given instruction in the use of any technology with which they

may not be familiar. Otherwise, the first barrier to successful completion of modules may be the medium/media used to deliver the instructional material.

**K14, K15:** Learner Control refers to the capability of the learner to control the level of learner activities (e.g., the rate at which they progress through the modules and/or the program; the sequence in which the instructional material is presented, etc.). In its broadest sense, learner control has three dimensions: *independence* (referring to trainees' freedom to choose learning objectives, activities and evaluation procedures or what, when, how and when they learn); *power* (referring to the psychological aspect of the learner--maturity, self-concept, motivation, etc.); and *support* (referring to the availability learning materials, tutor/instructor assistance, etc.).

Learner control can range from the mechanical manipulation of audio and video-cassettes to the planning of one's own path through a computer-based presentation such as hypertext. Instructional designers must determine how much control they want trainees to have. As a general rule, the greater the level of learner control, the more likely it becomes that the needs of different trainees will be met.

## SECTION 5: Trainee Support

**L1, L2:** Tutors are essential to the success of distributed training. Even with the best designed instruction, delivered using the most complex media, you still need to ensure that the "human touch" is not lost to the trainees. Tutor support is particularly

important for trainees on those programs that use non-interactive media.

**L3, L4:** In defining the role of the tutor in support of a distributed approach to training, you should consider the possibility that the tutor will be:

- a subject matter expert;
- in face-to-face contact with the trainees on a frequent basis;
- a correspondent only;
- centrally based;
- locally based;
- employed on a part time basis;
- employed on a full-time basis;
- posted to the unit where distributed training is conducted; and/or
- seconded/attached from primary job for tutor duties.

**L5, L6:** You should consider the possibility that the tutor in support of a distributed approach to training may be required to carry out the following tasks:

- comment on trainees' work;
- assess trainees' work;
- assist trainees to understand program materials through discussion;
- assist trainees in planning their work;
- conduct face-to-face or telephone interviews/discussions;
- supervise practical or project work;

- instruct at a resident or non-resident school or a local unit;
- participate in a personal contact program;
- maintain records of trainees' progress;
- provide feedback on program materials and trainees' problems to a local unit coordinator or instructional/standards staff at a training establishment or central school;
- negotiate with the training establishment on behalf of the student when problems occur;
- carry out lesson confirmations;
- administer Performance and Enabling Checks;
- administer entry and threshold knowledge tests;
- other...

**L7, L8:** It would be most unwise to assume that tutors employed in support of distributed training will already know how to do their jobs. Tutors may be required to interact with trainees face-to-face, by correspondence, and/or by telephone. For each approach they will require new skills and knowledge.

Even face-to-face tutors will find that their function is markedly different from what it may have been in a traditional classroom. Classroom instructors are the source of knowledge for their students and usually constitute the main means of delivery of program material. In distributed training, program material is presented by means of the medium selected for that purpose, and the tutors' role involves dealing with problems

arising out of the study of the program material, and acting as intermediaries between the trainees and the program designers. The lecture, a form of instruction with which both tutors and trainees will probably be most familiar and comfortable, is not suited to this kind of tutorial assistance. Experience has shown that training programs and support are needed to help tutors change their style to become facilitators of student activities or promoters of group discussions. Similarly, tutoring by correspondence or telephone requires special skills, and few classroom instructors will have had the necessary previous experience.

**L9, L10:** You should consider the possibility that trainees will be provided contact with the training establishment (instructors/tutors/facilitators) through:

- instruction in remote classrooms;
- individual tutorials at local centres;
- periodic attendance at resident/central schools;
- individual or group information/advisory meetings;
- occasional meetings with a tutor, either at the request of the tutor or the trainee;
- access to tutors at their homes or places of work;
- correspondence with a tutor or instructor;
- individual telephone contact with a tutor, initiated either by the tutor or the trainee; and/or
- group telephone contact (teleconference) for tutorial sessions.

## SECTION 6: Administrative Support

**M1, M2, M3, M4:** Higher administrative functions involving the planning, organization and control necessary for the successful use of a distributed approach to training are addressed throughout this decision-making model. In this section you should consider the requirement for the lower level administrative support necessary to sustain a distributed approach on a day-to-day basis. The extent to which such support is necessary will depend on the nature, size and scope of the training presented: can support be provided by existing staff or will additional staff be required? What support is required at the training establishment, remote classroom, local centre and/or trainees' support base? Will staff require training or can they learn their new tasks on the job? Although the kind of support being considered in this section can be fairly described as low-level, its importance should not be underestimated. Competent, and courteous administrative support can spell the difference between success or failure for trainees who may be feeling the loss of the support found in a central school and a traditional classroom. Administrative support will involve a myriad of tasks and ultimately will ensure that training is conducted in a manner which provides the maximum assistance to trainees and tutors.

The following is a checklist (by no means exhaustive) of the administrative tasks associated with distributed training:

- registration of students on courses;
- identification of instructor/tutor/counsellor requirements;

- allocation of students to local centres, tutors and/or counsellors;
- provision of advisory services (ensuring a means of communication with the training establishment is always available to trainees);
- maintenance of trainee records;
- competent and courteous treatment of all letters, prompt delivery of instructional material, etc. and proper reception of trainees calling in person or on the telephone;
- the coordination of technical support required by the training establishment (and thus the trainees);
- ready access, for training purposes, to telephones, fax machines, computers and other training/learning aids; and
- accurate, easily available registration of data.

**M5:** The introduction of the distributed approach to training, particularly on a large scale, may have a considerable impact on the existing infrastructure. It may result in training establishments (schools) altering the way "do business". For example, schools may assume new roles as managers of distributed training instructional resources. There may be fewer instructors and fewer classrooms devoted to resident training. The tasks carried out by command training staffs would also change as a result of the introduction of the distributed approach.

## SECTION 7: Instructional Materials

**N1:** It is essential that you identify any copyright restrictions that may exist on the instructional material you wish to use in the program. This applies not only to the use of entire books or software, but also to material excerpted from them. Usually, copyright owners have established terms of copyright that should be referred to and complied with before copies are made. (For example, the publishers Addison-Wesley and McGraw-Hill Ryerson will negotiate requests individually; the *NATO Review* is free for educational purposes, although they ask that appropriate credit be given and that they be informed which articles you have reproduced).

**N2, N3, N4, N5:** The same *team approach* that is typically used to develop Training Standards (TSs) and Training Plans (TPs) should be used when training is being developed for, or converted to, the distributed approach. As a minimum, the team should include: subject-matter-experts (SMEs), a Training Development Officer (TDO) and a media specialist. This team should be able to answer the questions contained in the model thus far and, in so doing, identify the additional team members required to develop the training. Membership on the development team will vary depending on the technology (print, audio, audiovisual or computer-based, etc.) selected for use with the distributed approach.

Prototypes of the instructional materials should be developed for evaluation purposes; it may save a great deal of time, effort and money to 'iron out the wrinkles'

in the prototype rather than the finished product.

You (or the team) may find that the personnel required to develop/convert and produce the instructional materials are not to be found within existing DND resources (either serving members or civilian personnel). In this event, many development/conversion and production functions may have to be contracted-out. An important consideration with contracting-out is that it may leave the personnel who will implement the training feeling a lack of "ownership". Training Establishment personnel (SMEs, instructors, etc.) need to be kept involved as much as possible in the development of, or conversion to, distributed training if they are to be involved in its implementation.

**N6, N7:** At first glance, the distribution of instructional material may seem a minor consideration. However, because the "material" may include anything from textbooks and computers to information conveyed over telephone lines, the means of distribution will vary depending on the medium or media selected for the program. The material may have to be distributed via mail, broadcast, data transmission or a combination of means.

The type of instructional material, and the means by which it must be distributed, will affect the way in which instructional material will have to be packaged for distribution. You must identify exactly what will be involved in packaging and distributing distributed training instructional material and determine if the tasks can be carried out properly in-house. If they cannot be, contracting-out will have to be considered.

## SECTION 8: Final Considerations

**P1, P2:** To this point in the model, you have:

- defined the need for a distributed approach to training for this program;
- determined whether or not each PO is suited to a distributed approach;
- selected the appropriate medium/media with which to deliver the program;
- identified program design features which must be included to assist the trainees in dealing with the distributed approach;
- determined the need for, and the role of, tutors in supporting the trainees;
- determined the need for tutors to be provided training to carry out their tasks;
- identified the additional administrative support required for the distributed approach and whether such support calls up training; and
- identified the resources required for the development/conversion, production and distribution of instructional materials.

You may consider that you now have sufficient information to respond to P1 and P3. However, you may consider it necessary to identify resource requirements more precisely, and estimate their cost, before responding. Although the model is not intended to provide a method of precisely determining the cost of the resources required, the following paragraphs contain a brief description of what should be taken into account.

There are four categories of resources that you should consider when addressing the resources issue: *personnel, facilities, equipment*, and *materials*. For each category, of program, there will be a "price tag". You must determine if the resources in all four

categories are available and if they are affordable. Using the information you have gained by using the model, and the four categories, you can create a framework to use when analyzing specific resource requirements and detailed cost estimates. The following describes each category:

**Personnel** - *what* functions have to be carried out to implement the Distributed Approach to this program, *who* do you need to carry them out *and how* much will their involvement cost? Personnel costs include the salaries of trainees, training analysts, instructional designers/developers, instructors, tutors, programmers, managers, administrators, artists, and production personnel. They also include fees for consultants who help design or evaluate the training programme and contractors who develop or provide training materials. Expenses associated with personnel (such as travel, temporary accommodation, meals, etc.) are also included in personnel costs.

**Facilities** - *what* "spaces" (remote classrooms, local centres, offices and so on) will be required to implement the distributed approach, will renovations or construction have to take place and *how much* will all of this cost? Facilities costs are those associated with the operation of training facilities, including all fixtures, maintenance, and upkeep.

**Equipment** - *what* will have to be acquired to implement the Distributed Approach to this program, and *how much* will it cost? Equipment costs include any equipment required for any aspect of training. This includes training devices such as audio-cassette or videotape players, computer terminals, teleconferencing

bridges and microphones, etc. It also includes any equipment used for "hands on" training for operators, technicians, etc. In addition, any equipment required for the production of training materials (e.g., cameras) should be included. Equipment costs should include operation and maintenance, as well as purchase costs.

**Materials** - *what* will have to be acquired to implement the distributed approach to this program and *how much* will it cost? Materials costs are those required for the design, development/conversion, production, distribution of training materials such as textbooks, tapes or computer programmes.

You are now in a position to determine if the resources in the above categories are or can be made available to distribute this program. If they are not or cannot be made available, then the distributed approach is not feasible. If the resources are or can be made available then you may continue to the last question of the model.

**P3, P4, P5:** You now know that the distributed approach is possible for this program. You must now determine if the distributed approach will meet the need you initially identified for it. If your need was one of cost saving you will have to compare the total cost for both the traditional and the distributed approaches and demonstrate that cost reduction can occur using the latter approach. If your need was to train more people than the traditional approach allows, then you will have to determine if you will be able to increase program throughput using the distributed approach. If your need was to provide just-in-time training, you will have to determine if this is possible.

| Topics in Order of Appearance | Reference |
|---|---|
| Instructional Scalars | DND, NDHQ (1990) |
| Modularization | Kearsley (1985) |
| Fidelity | Lane & Alluisi (1992) |
| Interactivity | Moore (1989), Garrison (1985) |
| Feedback | Store & Armstrong (1981) |
| Cognitive activity levels | Bloom (1971) |
| Non-interactive technologies | Harris (1991) |
| Computer-assisted learning | Garrison (1989) |
| Point-to-point/multi-point communications | Harris (1991) |
| Audio communications | Robinson (1984) |
| Videoconferencing | Harris (1991), Gunawardena (1990) |
| Audiographics | Garrison (1989) |
| Intrinsic and extrinsic motivation | Kearsley (1985) |
| Learner control | Garrison & Baynton (1987) |
| Tutors | Robinson (1981) |
| Administration of Distance Education | Holmberg (1981), Rumble (1986) |

Table 2: References to Topics Discussed in Notes

# APPENDIX B:

# CONSENT FORM

*Consent Form*

University of Calgary, Faculty of Education, Department of Curriculum and Instruction.

Date: ---------- I, ----------

hereby give my informed consent to participate in the research study entitled "Distributed Training in Canadian Forces Training: A Decision-Model".

I understand that the purpose of the study is to develop a decision-model to be used when deciding if the distributed approach to training is appropriate for a particular Canadian Forces course.

I realize my involvement consists of being available to provide comments regarding the content of the decision-model and to rank order the collated responses of myself and the other respondents on at least two occasions.

I am also aware that I may withdraw my consent to participate in the study at any time and that the researcher can terminate my involvement in the study at any time.

Signature ---------- Date ----------

# APPENDIX C:

# ETHICS APPROVAL

THE UNIVERSITY OF CALGARY

EDUCATION JOINT RESEARCH ETHICS COMMITTEE

CERTIFICATION OF INSTITUTIONAL ETHICS REVIEW

This is to certify that the Education Joint Research Ethics Committee at The University of Calgary has examined and approved the research proposal by:

Applicant: Elizabeth A. Syvertsen-Bitten

of the Department of: Curriculum and Instruction

entitled: Distributed Training in the Canadian Forces: A Decision-Model.

(the above information to be completed by the applicant)

March 7, 1994
Date

Chair, Education Joint Research Ethics Committee

# APPENDIX D:

# REQUEST FOR COMMENTS ON INITIAL DECISION-MODEL

**Distributed Training in the Canadian Forces: A Decision-Model Request for Comments**

Please comment on the model and its accompanying notes.

You will note that the model consists of series of blocks which present information, direction or questions.

You are requested to work your way through the model examining each of the blocks in turn. Please do not comment on blocks you consider acceptable. If you do not consider a block acceptable, however, please identify it (e.g., A3, B7, C9, etc.), and comment on it. Your comment would be most useful if you were to state (a) what it is that you find unacceptable or inadequate about a block and its accompanying notes, and (b) what you would do to make them acceptable (if you consider that they should be re-written, please provide your revised version; you might also consider that a block should be omitted or relocated within the model). Please bear in mind that the notes are intended to amplify and/or clarify the blocks and are not intended to be encyclopaedic.

You are also requested to identify any information, direction and questions that you consider should be added to the model (in the form of additional blocks and accompanying notes).

Finally, any general comments on the design and usefulness of the model would be appreciated.

Should you require clarification on any aspect of the model, or on this request for comments, please do not hesitate to call me at (403) 241-3817.

Thank you.

# APPENDIX E:

# COVERING LETTER TO REQUEST FOR COMMENTS

# ON INITIAL DECISION-MODEL

188 Scenic Hill Close NW,
Calgary, Alberta
T3L 1P4

March 94

Let me, first of all, thank you for participating in my thesis research. Your expert comments and advice are much appreciated.

The material enclosed is in four parts: an introduction; the decision model with accompanying notes; a request for comments; and a consent form. I had considered providing a booklet for you to use in commenting on the model, but I decided that you would probably prefer to use your computers.

In developing this model, I drew upon two main sources of information: the literature on Distance Education and Distributed Training; and the Canadian Forces Manual of Individual Training (which describes and provides guidance on the Canadian Forces Individual Training System (CFITS)).

I hope that this decision model will eventually prove to be useful to Canadian Forces Training Development officers and others tasked with making informed decisions regarding the introduction of the distributed approach to training. In the short term, however, I hope to produce a thesis which meets with the approval of the folks at the University of Calgary. Some limitations have been imposed on the model to keep the scope of the research appropriate to an MA thesis topic. The model does not present for

consideration factors related to the evaluation and validation of training. Nor does it provide a method of precisely determining the cost of resources required to develop, or convert to, a distributed approach. These limitations would be addressed before offering the model to CF trainers. In the meantime, they are not considered critical to the model's effectiveness.

Once I have received your responses, and those of the other three respondents, I will combine them and provide each of you with a copy. I will then ask you to rank order the comments, giving the highest ranking to those with which you agree the most, and the lowest ranking to those with which you disagree the most. At that time I will also invite you to provide any new comments that may have occurred to you. It may then be necessary to ask you for final comments and rank ordering.

I hope that this process will result in a revised model which meets with the approval of at least five people knowledgeable in the CFITS and/or Distance Education.

I would appreciate it if you would let me have your comments no later than the end of April. Anytime before that would be a bonus for me. I had intended to get this out to you sooner, but predictable "unforeseen circumstances" got in the way!

Would you please read and sign the consent form which is enclosed and return it with your comments.

If you have any questions about the model or the notes please do not hesitate to call (403) 241-3817. Again, let me say how very much I appreciate your participation.

Elizabeth A. Syvertsen-Bitten

# APPENDIX F:

# SUMMARY OF RESPONSES TO INITIAL DECISION-MODEL

**RESPONSES TO:**
**DISTRIBUTED TRAINING IN THE CF: A DECISION-MODEL**

**1. BLOCK/NOTE IDENTIFIER:** A1, A2.

Response(s):
***Respondent # 2:***
Need is either inability of training programme to satisfy requirements, deficiency in approach and/or inefficiencies. A list of factors to consider in defining need is suggested.
***Respondent # 3:***
Recommend addition of "provide educational opportunity not otherwise readily available due to dispersed numbers of students or personal circumstances of students that makes it difficult for them to get to a centralized school".

Reaction to Response(s):
***Respondent # 2:***
Agree. You have defined the need; however, I feel that the need is defined in the notes, albeit indirectly, by providing examples of what is to be gained by adopting or converting to the distributed approach. At this stage, I would prefer to go with the examples provided rather than try to be encyclopaedic by providing a list of factors. The user of the model is asked to determine why the distributed approach is being considered as an alternative to "traditional" classroom training. The intended message to the user is that it should not be employed just to take advantage of technology or to be "trendy".
***Respondent # 3:***
Agree. Although formal, qualification training in the regular force CF has to be provided, and trainees must attend even if they are widely dispersed. In this case the primary consideration is cost: it is very expensive to bring them to a central location, house them, feed them etc. not to mention their time away from their primary job. Your comment would apply more to specialist training for the regular force; and from the personal circumstances side of it, your comments certainly apply to Reserve Component personnel who cannot usually spare more than two weeks for training at a central school, if they are even permitted to leave their civilian job for military training.

Effect on the Decision-Model:
***Respondent # 2:***
No modification will be made to the notes at this time.
***Respondent # 3:***
Notes will be modified to reflect this comment (reference will be made to "training" rather than "education" and to "trainees" rather than "students").

Respondents' Comments:

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**2. BLOCK/NOTE IDENTIFIER:** A3, A4.

**Response(s):**
***Respondent # 2:***
Writing of POs, EOs, and TPs is essentially the Instructional Analysis process. The next step is the identification and selection of learning strategies and activities required to have learning occur.
***Respondent # 4:***
(Paraphrased) - The focus in this model is on "the course"... what about the training program?

**Reaction to Response(s):**
***Respondent # 2:***
Agree. We don't need the whole EO in its 12 part format (which includes training aids and learning aids). What is needed, as you point out, is that an instructional analysis be carried out to produce a scalar. This will ensure that a clear picture of the instructional content is provided.
***Respondent # 4:***
Yes, the recent policy change which introduces single multi-purpose documents does affect the model. The introduction of the training program concept (covering a full range of training "strategies" - course, on-job, out-service, etc.) should be taken into consideration.

**Effect on the Decision-Model:**
***Respondent # 2:***
Block A4 will be modified to read: "For a new program, conduct instructional analysis to scalar level. Resume at A9". The notes will be modified accordingly.
***Respondent # 4:***
The entire model will be modified to reflect the policy change ("course" will be changed to "program").

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**3. BLOCK/NOTE IDENTIFIER:** A5.

**Response(s):**
***Respondent #1:***
What about developing a new course as a distributed learning course? Is it possible? If not, why not? Does it have to be designed and implemented as a standard course first?
***Respondent # 2:***
The starting point of the proposed model is an up and running validated course; i.e. that this is a conversion process rather than a redesign process; as a general rule, the distribution of existing training requires considerable redesign, particularly in the selection of learning strategies, activities, exercises.

**Reaction to Response(s):**
Block A4 was intended to indicate that the course being considered could, in fact, be a new course. It is obvious from the feedback that this was not clear. The modification to block A4 as described above, plus a modification to A3, should resolve the confusion.

**Effect on the Decision-Model:**
Block A3 will be modified to read: "Is this an existing program, i.e., with a Training Standard (TS) and a Training Plan (TP)". Block A4 will be modified as described above (section 2). The notes will be modified accordingly.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**4. BLOCK/NOTE IDENTIFIER:** A9, B1.

**Response(s):**
***Respondent #1:***
(A9) - It has been my experience that many courses are not at steady state. Maybe the reason that some are not is that the distributed approach should have been used and wasn't.
(B1) - What about a course that is prohibitively expensive to run in-house, requires large numbers of people to be trained simultaneously, has a target population that covers the globe, but will be outdated in two years or less?
***Respondent # 2:***
(A9, B1) - There could be a short term requirement where the distributed approach is viable i.e. a large number of personnel, dispersed across the CF requiring immediate training in a specific area such as blitzing the CF and DND population with new skills and knowledge related to new approaches in management.
(B1) - There are additional factors such as risks, cultural acceptability, costs, funding availability, other systems requirements, operations, etc...
***Respondent # 3:***
(A9, B1) - (Paraphrased) Question the ideas that a course ought to be at "steady state" and that the requirement for the course should exist for at least three to five years for the distributed approach to be feasible. Is it realistic to assume that a training requirement should exist and/or remain the same for three to five years? Is it possible that a training requirement may persist but that content might change? How does course revision fit into the schema? It would seem that some revision will always be required.
Also, (paraphrased) in the notes to A9, B1 you indicate that analysis and design must be painstaking to limit revisions. Shouldn't the possibility of revisions be planned for? How about piloting or developmental testing?
***Respondent # 4:***

(A9) - Will the model work if it has to be applied in a situation where there is no steady-state course (eg, new requirement, not intended to be a formal course, is to be presented in conjunction with other programmes, etc.)?

**Reaction to Response(s):**

***Respondent # 1***

(A9) - The intent of Block A9 was only to establish that the training requirement for the course under consideration was not likely to disappear or change significantly in the immediate or near future, i.e., it had been established either by validation (in the case of an existing course), or by needs/occupational analysis (in the case of a new course), that the course objectives were realistically based on current job or specialty requirements. (The term "steady state" was intended to relate to the training requirement for the course rather than to any need to revise the course internally in response to an evaluation study or to perceived design flaws).

(B1) - Agree that a distributed approach might well be justified in this case. Although it is noted in the introduction that users will on occasion have to make decisions based on less than conclusive data, and that there will always be "exceptions to the rule", the notes will be modified to stress that each course must be considered on an individual basis. Your example will be included in the modified notes to A9. (B1 and B2 will be omitted).

***Respondent # 2***

See reaction to Respondent # 1 above. Your examples will also be included in the notes.

***Respondent # 3***

See above reactions, especially as they relate to your comments on "steady state", the 3-5 year requirement and the course revision requirements. Block A9 will be modified to eliminate the term "steady state". The 3-5 year requirement seemed valid enough when I designed the model, but in light of respondents' comments no longer seems to me to be so. Block B1 and B2 will be omitted.

As far as planning for revisions and developmental testing...both are routinely carried out as functions of the CFITS. "Getting it right" from the beginning is something our designers strive for (through the use of pilot courses etc.). When training is conducted it is constantly evaluated to ensure that training matches the Performance Objectives. Where we must avoid mistakes is in the initial analysis of the tasks to be performed on the job, the identification of those tasks which require training and the writing of the POs.

***Respondent # 4***

Yes, I hope/think so, especially in its modified form based on respondents' comments.

**Effect on the Decision-Model:**

Block A9 will be modified to read: "Are POs realistically based on current job or specialty requirements"? Blocks B1 and B2 will be omitted. Notes to A9 will be modified to make it clear that it is the intent of the model to consider both existing and new courses; and that the question posed by A9 should be answered by referring to a validation study for existing courses and to needs/occupational analysis for new courses.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**5. BLOCK/NOTE IDENTIFIER:** The Performance Objectives - Section 2.

**Response(s):**

***Respondent #1:***

(General comments on the section) - Definitions and/or descriptions of psychomotor, cognitive and affective would be useful in the initial part of the notes section. Perhaps a glossary to accompany the model notes?

***Respondent # 2:***

(C1 - C3) - Psychomotor is not the same as skill; a modularized perspective is required at the learning strategy, activity level.

(C5, C6) - (Paraphrased) A PO refers to a performance. In all performance, elements of the three domains, cognitive, psychomotor, affective, are present to varying degrees. More and more, we find POs with strong elements of the affective domain, eg. comply with anti-harassment, and anti-racism policies.

(C7, C8) - The term fidelity as used basically refers to the transferability of the learning to the job performance. Fidelity is generally associated with simulation and simulators. The concept of training limitation does not fit well into the performance oriented approach whereby we train to a defined performance. The test is performance on the job. If the student has not been training to job requirements the training is ineffective and must be corrected. The term is used within the CFITS to indicate, euphemistically, training that has not been completed. It refers mostly to resource issues at training establishments.

***Respondent # 3:***

(General comments on the section) - (Paraphrased) The terminology used in this section is a bit confusing. Can a "performance objective" have a cognitive component? I would view POs as behavioural objectives (learning is operationalized by measurable, observable outcomes); a view I find antithetical to what I think of as "education".

(C1, C2, C3) - Notes are confusing here...these three actually pertain only to the classified nature of the course content.

**Reaction to Response(s):**

***Respondent # 1:***

Agree. The notes will be modified to include a glossary of terms at their beginning.

***Respondent # 2:***

(C1 - C3) - Agree that psychomotor is not the same as skill. Agree also that it would be better to group and modularize the instructional content at this point in the model and prior to media selection. Using the instructional analysis scalar, or if it is not available, the instructional content identifiable at the PO, EO and TP *levels*, the instructional content could be grouped, as you suggest, based on learning activities and modularized. The appropriate medium/media could then be identified for each module.

(C5, C6) - I agree with what you say here. The intent of the distinction made in the model between psychomotor and cognitive was to provide a kind of dividing line between those POs, or portions of POs, which would "fit" more in the psychomotor domain than the cognitive and vice versa.

(C7, C8) - The term fidelity, as you say, is associated with simulation and simulators; however, its use is not limited to them. The term is being used more broadly in both training and education as a means of expressing the extent to which the training/educational situation or environment resembles real situations and environments.

You have expressed an opinion about training limitations with which, for the most part, I agree. However, reality is such that schools, due to lack of equipment, resources, etc., cannot always provide a training situation with enough "fidelity" to prepare a trainee for every aspect of the real job. (An excellent argument for more distributed training or perhaps training qualifications granted in phases - first from the school then from the job site). The current Volume 6 of the 9000 series allows that item 7 may be included in POs - a description of any significant training limitations (p. 1-9).

***Respondent # 3:***

(General comments) - Yes, from the CF's perspective, a PO can have a cognitive component...and an

affective component. We use the term PO in the manner you describe (observable, measurable), but in our case, the PO is a description of the performance required on the job for which training is required. It, in all likelihood, will be made up of components from all three domains. As you may imagine, as military equipment (weapons, vehicles, communication equipment, etc.) becomes more technologically advanced, the cognitive component of a performance which was once primarily psychomotor, increases significantly.

(C1, C2, C3) - Agree, the notes do not fit with the blocks; they will be rearranged.

**Effect on the Decision-Model:**
***Respondent #1:***
A glossary of terms will be added to the front of the notes which accompany the model.
***Respondent #2:***
The title of Section 2 will be changed to read: "Section 2: Instructional Content".
The blocks in Section 2 will be modified to remove the emphasis from the POs (and whether they are primarily skill or knowledge) and place it on the instructional content. The section will require the user to group the instructional content based on the learning strategies/activities appropriate to the content, and then to develop instructional modules made up of the group(s) of instructional activities.
***Respondent # 3:***
(General comments) - See answer to Respondent # 2 above.
(C1, C2, C3) - Notes will be modified to correspond with the blocks.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**6. BLOCK/NOTE IDENTIFIER:** Section 2 - Sequence D.

**Response(s):**
***Respondent # 1:***
(General comments) - More detail on interactivity, perhaps with an example, would be useful here. You go into more detail in later sections, but more detail here would provide better cues for decisions.
***Respondent # 3:***
(D3) - (Paraphrased) Find the terminology confusing... D3 says "Use informative non-interactive media; F3 says "Use one-way interactive instructional media". Is there a distinction between these two?
(D4) - You don't always require media for interaction do you? Some training programs may work best if students get some practical lab/field experience - but it's only a part of the training course. Or classified material could be covered in some limited number of classroom sessions as part of the course (eg. week-ends; summer school). Depending on what needs to be done, tutors can also provide opportunity for interaction (eg. to practice/illustrate communications/language skills).

**Reaction to Response(s):**

***Respondent # 1:***

Agree. The notes on interactivity should provide a clear explanation of how the term is used in this model. For interaction to occur, communication must be two-way, but it is not essential that the communication take place between two persons. If a medium is capable of providing feedback, and if that feedback is immediate, constant, explanatory (rather than judgemental), concise and clear, then it is considered, in this model, to provide interactivity.

***Respondent # 3:***

(D3) - Agree. I think that the addition of the above explanation of interactivity will help. For example, standard textbooks are informative but because they do not, by themselves, provide feedback, they are considered non-interactive. As for F3, your later comments are correct; it will be removed from the model entirely.

(D4) - Agree, you don't always need media for interaction. As you say, a training program may include "hands-on" and classroom sessions. Admittedly, this model is geared for instructional material which emphasizes the cognitive (and unclassified). Now that the CF is taking a program-oriented approach to things (as discussed under Block Items A3, A4), the other aspects of the "program" will be dealt with appropriately (and likely without media).

Agree that tutors are an excellent source of interactivity. In this model, they are considered essential regardless of the media selected.

**Effect on the Decision-Model:**

***Respondent # 1:***

The above explanation will be added to the notes on interactivity.

***Respondent # 3:***

No additional modification to the model.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**7. BLOCK/NOTE IDENTIFIER:** Section 2 - Sequence E.

**Response(s):**

***Respondent # 1:***

(E1) - Interactivity for standard text can be enhanced with the use of a workbook or questions based on the text.

(E2) - An ability to record (available on even the cheapest cassette players) can help the interactivity - in language training for example, it would allow students to repeat a phrase, or pronounce a word and compare their results with the pre-recorded phrase or word.

(E3) - When body language, facial expressions or full movement is required for understanding (as in

affective domain learning), full motion video is almost essential. Interactivity in linear video can be enhanced by adding a workbook that allows students to reflect on a passage, perhaps answer questions or decide between a number of possible alternatives, and restart the video to determine the results.
*Respondent # 3:*
(E2, E3, E4, E6, E7) - Question the learner control offered by audio and video-cassettes. Control is offered but in a very limited sense.

**Reaction to Response(s):**
*Respondent # 1:*
(E1, E2, E3) - Depending on how interactivity is defined, I would agree with what you say. However, for the purposes of this decision-model for interaction to occur, communication must be two-way (although not necessarily between two persons). If a medium is capable of providing feedback, and if that feedback is immediate, constant, explanatory (rather than judgemental), concise and clear, then it is considered to provide interactivity. A notebook would certainly enhance the informative nature of standard text, but in this model, it does not provide interactivity unless the type of feedback described is provided. The same applies for audio and video-cassettes.
*Respondent # 3:*
Agree, the control offered by these media is limited.

**Effect on the Decision-Model:**
*Respondent # 1:*
The notes will be modified, as previously mentioned, to provide a more precise explanation of interactivity.
*Respondent # 3:*
Notes will be modified to indicate the limited nature of the term "control" as used here and to elaborate on the composition of learner control (independence, power, and support).

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**8. BLOCK/NOTE IDENTIFIER:** Section 2 - Sequences F & G.

**Response(s):**
*Respondent # 3:*
(F3) - (Paraphrased) The term "one-way interactive instructional media" is oxymoronic. Are programmed text and CAL any more interactive than flipping pages of a book or starting/stopping through video and audio tapes? They are certainly not interactive in the same sense implied by instructor/tutor - student interaction. How about simply doing without Box F3 and having F2 flow directly on to F4?
(F7, F9, F10) - (Paraphrased) There needs to be a condition included here about using these technologies if possible. There are a many instances in which any or all of: the technology; required infrastructure; and

expertise to use such technologies; are not available. In some instances, "non-feasibility" of a particular technology might prohibit the use of the distributed approach. Or the choice might be to modify the course delivery (for example, is programmed text so instructionally effective? Why not just write the instruction differently?)
(F9, F10) - How could we factor in questions as to which, if any, of these general types of technologies are even available?
(G1, G2) - Don't forget mail/correspondence.
(G5, G6) - What happens if I get to these boxes but I know CMC will not be available to me? The algorithm leaves me hung up at this stage.
***Respondent # 1:***
(F5) - Does anybody still use programmed text? Has anybody ever used it extensively?

**Reaction to Response(s):**
***Respondent # 3:***
Agree with your opinion of the term "one-way interactive instructional media". Block F3 will be removed. As for the interactivity provided by programmed text and CAL, both of these media can provide the type of feedback described in the above discussion of interactivity and thus for the purposes of this decision-model, are considered interactive media.
(F7, F9, F1, G5, G6) - Agree, it may be obvious as soon as a medium is selected that it is not available (likely due to financial constraints). It does not mean that the distributed approach should be abandoned. It does mean, however, that an alternative (possibly cheaper) medium may have to be used. This will have implications for the support offered to the trainees to provide the interactivity needed.
(G1, G2) - The asynchronous communication provided in correspondence courses delivered using the postal system should be discussed to a greater extent in the model/notes. It will be discussed in the notes to media selection sequence D.

***Respondent # 1:***
(F5) - You're probably right, but I think I should include it anyway.

**Effect on the Decision-Model:**
***Respondent # 3:***
Block F3 will be removed from the model.
(F7, F9, F1, G5, G6) - A cue will be added to each block where a medium is selected to direct the user to determine availability and/or feasibility of the medium and if necessary to look for an alternative.
(G1, G2) - The notes to media selection sequence D will be modified to describe the asynchronous communication provided by correspondence courses delivered via the postal system.
***Respondent # 1:***
No change to the model.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**9. BLOCK/NOTE IDENTIFIER:** Section 3: The Course - J7, J9.

Response(s):
*Respondent # 1:*
(J7) - the wording of the algorithm is somewhat confusing. Suggest "Have procedures for monitoring trainee progress and maintaining records been identified?"
(J9) - This section in the algorithm may not be applicable to all courses. Suggest an interim step "Will computers be used" or something.
*Respondent # 4:*
Change course to program

Reaction to Response(s):
(J7) - Agree that the wording is confusing. Your suggestion for an alternative is accepted.
(J9) - Agree, this will allow non-computer users to by-pass the strictly CAL questions.

Effect on the Decision-Model:
*Respondent # 1:*
(J7) - This block will be modified to read "Have procedures for monitoring trainee progress and maintaining trainee records been identified?" Block J8 will be modified to read "Identify procedures for monitoring trainee progress and maintaining trainee records." The notes will be modified to reflect the change of wording.
(J9) - This block will be modified to read "Will computers be used to deliver all or part of the instructional material". The "No" response will take the model user to K; a "Yes" response will take the user to new blocks J10 and J11, which will read exactly as the original J9 and J10 respectively. The notes will be modified accordingly.
*Respondent # 4:*
The title of this section will be modified to read: "Section 3: The Program"

Respondents' Comments:

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**10. BLOCK/NOTE IDENTIFIER:** The Trainees - K12.

Response(s):
*Respondent # 1:*
(K12) - This does not apply to non-computerized course. Suggest rewording to something like "Do trainees have experience with the technology being used?". This covers all bases as a "yes" answer will be forthcoming if the selected medium is "text only" (unless, of course, the trainee can't read).

**Reaction to Response(s):**
(K12) - Agree.

**Effect on the Decision-Model:**
Block K12 will be modified to read, as you suggest: "Do trainees have experience with the technology being used?". Block K13 will also be modified to read: "Provide guidance or tutorial assistance specifically related to the technology being used." The bracket which reads "hardware and software" will be removed. Notes will be modified accordingly.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**11. BLOCK/NOTE IDENTIFIER:** Trainee Support - Section 5.

**Response(s):**
***Respondent # 1:***
(General comments) - What if tutors are not used? There is no provision in the model for this eventuality. Can distance learning be done without tutors? If so, how?

**Reaction to Response(s):**
My own view is that distributed training should not be implemented without tutors (although their degree of involvement with trainees might vary) and I want the model to reflect that view. The human element is an essential part of the support to students learning at a distance and thus critical to the success of the program. The need for tutors will be stated more strongly.

**Effect on the Decision-Model:**
Block L2 will be modified to read "Tutors are an essential ingredient in trainee support and as such are critical to the success of distributed training." Notes will be modified to place greater emphasis on the use of tutors.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**12. BLOCK/NOTE IDENTIFIER:** Administrative Support - Section 6.

**Response(s):**

***Respondent # 1:***

(General comments) - An important aspect, often ignored. Does this area include technical support for the equipment? Who will register grades, etc.? Is there another possibility for training of administrative staff other than OJT?

***Respondent # 3:***

(General comments) - How will all of this be coordinated?

**Reaction to Response(s):**

***Respondent # 1:***

The coordination of technical support (whether done "in-house" or contracted-out) would likely be handled by the administrative staff. I think it would be useful here to provide a checklist of the types of tasks to be carried out by the administrative staff. Some questions, such as yours regarding registration of grades, may have been answered previously when determining the tasks of tutors. Of course, if it was decided that the tutors would not be responsible for such activities, then it likely falls to the administrative people. The alternative to OJT is, of course, to provide them with some sort of training. A "yes" answer to block M3 would indicate training is required and the requirement would then be included as part of Section 7. In other words, it becomes a part of the overall instructional development. This needs to be pointed out more clearly in the model.

***Respondent # 3:***

I *believe* that the administrative functions would be coordinated using the existing school/base infrastructure. Either existing staff would be assigned additional tasks, or new staff would be hired to deal specifically with distributed training related tasks. However, to be on the safe (and thorough) side, it would be better to add an additional block in this sequence dealing with the effect on the existing infrastructure. It would be useful, in the notes, to emphasize the importance of determining the impact of new tasks and/or new staff on existing infrastructure.

**Effect on the Decision-Model:**

***Respondent # 1:***

A checklist of administrative tasks associated with distributed training will be added to the notes accompanying block M1. The notes to block M3 will be modified to ensure that administrative staff training is included in the overall development considerations (sequence N).

***Respondent # 3:***

A block will be added to Section 6: "Determine the impact of the distributed approach on the existing infrastructure (command/school level)".

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**13. BLOCK/NOTE IDENTIFIER:** Section 7: Instructional Materials & Section 8: Final Considerations

**Response(s):**
***Respondent # 1:***
(General comments - Section 7) - This could be a model on its own. The overview given will help in the initial decision making process, which this model is intended to provide, but MUCH more information will be required to implement the course.
(General comments - section 8) - Good summary and conclusions. A cost-effectiveness model would fit nicely here.

**Reaction to Response(s):**
(Section 7) - Agree, this could be a model on its own. For academic purposes, the model was intended only to provide the overview to which you refer. Perhaps this should be pointed out more clearly in the notes. I will be recommending in Chapter Five of the thesis that further development of the model for use by the CF include an implementation plan.
(Section 8) - Agree. Another item for Chapter Five and the future development of the model.

**Effect on the Decision-Model:**
No change to the model at this time.

**Respondents' Comments:**

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)

**14. GENERAL RESPONSES ON THE DECISION-MODEL:**
***Respondent # 4:***
(Paraphrased) - Processes and methodologies associated with some blocks would be difficult to address for non-training specialists. It is therefore recommended that the model:

a. Identify intended users of the model;
b. Provide "cue-cards" to explain appropriate activities, methodologies and/or areas to be addressed; and
c. Refer user to relevant sections of CF policy/guidance documentation where necessary.

It is also recommended that the model place more emphasis on the selection process activities that take place before the school gets involved.
***Respondent # 2:***
In addition to presenting factors associated with program content, target population and support requirements for consideration, the model should address other aspects which contribute equally to the decision to distribute a given program. These include:

a. Costs: While costs are covered in the "Final Considerations", the decision-maker must pay much more attention to this area. For each of the categories mentioned [program content, target

population, training support] up-front start-up (or implementation) costs must be detailed, steady state costs (for upgrades, updates or modifications) must be estimated. Further, the availability of these resources must be determined and earmarked;

b. **Management Issues:** Distributed Training requires significantly different management protocols, particularly in a complex organization like the CF. Protocols for student management/control have to be defined, agreed to and promulgated; courseware, hardware (in the case of technology) and program configuration management have to be established and implemented; responsiblities and functions have to be delineated and assigned; and

c. **Impact:** The impact of distributing training programs on the receiving sites, other systems (such as pay, postings, career management, financial information, etc.), and organizational structure (such as establishing a centre of expertise to manage large/complex programs) has to be assessed. In some cases, the impact would preclude any gains from distributed training.

The decision model...provides a good assessment of the feasibility of going the distributed route from a contents, student, school perspective. The feasibility of distributing training with respect to costs, management issues, and impacts must still be determined. In short, a training program will only be distributed if:

a. there are deficiencies in the current training program such as not enough personnel being trained, wrong persons being trained, training is not received at the right time, too much time away from unit, personnel cannot be made available for training at a central location; and/or

b. there are inefficiencies in the training such as excessive travel, infrastructure, and personnel costs or wasted resources; and

c. the distribution of the program is feasible in all of the areas mentioned above.

The decision model is a good workable tool to determine the feasibility of distributing training based on content, students and training establishment issues. Situating this tool within the broader context of the complete list of factors surrounding the distributed training decision-making process would be invaluable to the user.

***Respondent # 3:***

(Paraphrased) The nature of some media (e.g., audiographics), is such that it needs to be run with small groups running at regular times. This becomes a condition of offering the course. How can the model test for this (or indicate it somehow in the notes)?

**Reaction to Comments:**

***Respondent # 2***

As described in the covering letter to the decision model (dated 28 Mar 94), limits have been imposed on the scope of the thesis and therefore on the decision model itself. In general the focus of the thesis and the model is, as you note in your comments, on content, target population and support in a distributed training context. It is agreed that for CF use the model should be situated "... within the broader context of the complete list of factors surrounding the distributed training decision-making process", including costs, management issues and impact. Although this will be done before the model is offered to CF decision-makers, it will not be done as part of the thesis. It is beyond the established scope of the thesis, and it would be unfair to expect civilian academics to interpret and assess a detailed examination of CF management issues, command and control mechanisms, organizational structures, etc.

***Respondent # 4***

Your points are well taken and, if and when the model is offered to CF trainers, they will be taken into account. (As part of a thesis rather than as a "working tool", references to the 9000 series, for example, would perhaps be inappropriate). I think that Section 1, dealing with preliminary considerations, is pretty straightforward and requires no particular specialist knowledge to work through. When a board is convened to consider adopting, or converting to, a distributed approach (at NDHQ or Command level, not at a school level, but definitely with school involvement), I would very much hope that it would include people with the appropriate background and expertise, both subject matter and specialist, and that they are given sufficient time for their deliberations.

*Respondent # 3*:
The media selection sequences will ask the user to determine the interactivity requirements of the instructional content (whether or not the trainee needs to interact with the instructor, with other trainees etc.). Once the interactivity requirements have been determined, the model leads the user to the medium most capable of meeting the requirements. And, in reference to one of your previous questions, if this particular medium is not available or feasible then an alternative medium may be selected. Because the alternative medium may not provide the needed interactivity itself, designers will have to ensure the interaction is provided by other means.

**Effect on the Decision-Model:**
No further modifications will be made to the model at this time.

**Respondents' Comments**:

__ I am satisfied with the reactions to the responses and the effect on the decision-model.

__ I am not satisfied, for the following reasons: (please use separate sheet if necessary)