

**INTRODUCTION TO THE DISCIPLINE
OF FUNDAMENTAL DESIGN METHOD**

*Extracts from Address to Design Research Society Seminar on F.D.M. Training—
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F.D.M. is a meta-system, tuned to produce 'the optimum solution to the sum of the true needs of a particular set of circumstances'. When this requirement has been clearly understood, and accepted as the over-riding control on all thinking, a person will continue to grow in capability. His rate of growth in the ability to analyse and solve major problems, and to become truly creative in various fields of endeavour, will then depend solely on his response to what the discipline dictates.

Nature of F.D.M. Controlled Thinking

F.D.M. has been developed for obtaining an improved approach and achievement in the analysis and solution of major industrial problems. Whilst being suitable for application to problems of the most complex nature, it is equally applicable to open-ended, 'real-life', problems of any magnitude. It can be applied in the actual moment of live thought; one does not have to rely on either a pre-planned strategy, or an after-the-event examination. It is not a theory, produced in some remote academic vacuum. It is a reality, born of many thousands of hours of toil and reflection in tackling a wide range of major problems.

These problems, and the personalities of hundreds of people, have all contributed something of significance to the development of the discipline. It could not have developed except through trial and error of this kind. It has taken a lot of years and a lot of effort to arrive at our present understanding of how any individual can quickly achieve a new order of control over his own work, in whatever field this work happens to lie. It is my hope that this understanding will not be lost and that it will help to pave the way for human achievements of a magnitude that would currently seem to be an impossibility.

The Essence of F.D.M.

Essentially, the discipline of F.D.M. is simple, but the learning process that makes it possible is likely to be beset by many frustrations and disappointments, and raises problems of describing what it is like. As with learning to drive a car, to sail, to vault, to swim and a host of other skilled operations it is far easier to do than to describe once one has, through actual experience, acquired a feel for what is involved.

The problem of appreciating what is needed and possible is doubly difficult since whereas one is left in no doubt of one's failings in co-ordinating and controlling physical skills, a low order of skill in co-ordinating and controlling one's own thinking is not immediately obvious. Anyone who has not considered the matter deeply can be pardoned for deluding himself that his own thinking is already highly disciplined and that the forms which it produces are therefore eminently satisfactory. With reflection, there comes the realization that if a person's thinking does produce appropriate form—even fifty per cent of the time that he is intent on so doing—then such a person is indeed fortunate.

F.D.M. Controlled Thinking cannot begin to make sense until a person is prepared to admit that his own thinking could usefully be subjected to control of a higher order. A person must also have privately agreed not to quarrel with the term F.D.M., or try to equate it to what is done under other names, or to what already exists in the controls that are exercised. F.D.M. has to be recognized merely as 'factor X' where X stands for the kind of further control that is needed. Similarly, F.D.M. training is recognized as 'factor Y' where 'Y' represents a means of producing X. Both X and Y, whilst having some common characteristics, will differ in many others to suit the personality and current level of development of the particular individual. One must not expect either X or Y to be reducible to a universally binding formula if each is to suit one's own special needs and hold the key to control of a high order.

Improving the Control over Thinking

The simple cybernetic element can serve as a point of departure for developing an understanding of what is involved in establishing a higher degree of control over one's thinking:

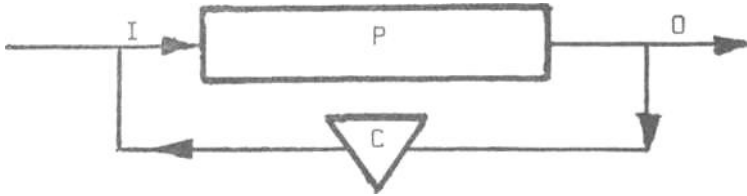


Fig. 1

The input (I) is from without (various recorded data, the problem, the problem situation and the total environment) and also from within (one's memory, feeling, etc.). The output (O) may express itself in ideas, lines, figures, decisions, etc. The process (P) is likely to be largely beyond the spotlight of consciousness, and at the onset the control (C) will be only partially conscious. In order that thinking shall be more capable of producing form that is truly appropriate to the total circumstances applying, it is necessary to obtain an enhanced awareness of certain aspects of I, O, P, and C. The extent, and the direction, of the increase in awareness that is required will be different for every person. The point at which this awareness needs to develop into a deep understanding, such as can be used as the basis of enhanced control, will similarly be a unique requirement of the particular individual.

It has been necessary to draw attention to differences in requirements. Yet even the reference to the simple cybernetic element serves to suggest certain similarities that underlie these differences. By involving oneself in a process of careful observation and reflection, such as is undertaken in F.D.M. training, it is possible to develop an understanding not only of special aspects of the particular problem and of one's own response to it, but also of matters that are truly fundamental. Such fundamentals relate both to *all* problems and problem-situations and to all thinking and mental actions that such problems require. The process of acquiring such understanding has to proceed in two directions: to uncover facets and factors of I, O, P, and C, and to interpret their essential nature, extrapolating beyond them to the ideal. There are also various checks that have to be introduced into this process to ensure that a balance is maintained between the subprocesses of observation, interpretation, and idealization, so that what is discovered may correspond with what exists and with what ought to exist.

As this process continues there is a massive expansion of awareness, and subsequently of understanding. This expansion includes progressively more of the person—problem—solution relationships and it develops in depth to explore the intimate circumstances and inner mechanisms of one's mental life. Provided that the checks mentioned are all operating, this process cannot degenerate into pointless or morbid curiosity, but remains full of purpose: to pursue intelligently the possibilities for greater achievement and performance that such understanding reveals.

The Fundamental Dimensions

There are three dimensions which I believe are fundamental to the whole of creation. These dimensions, which I have called 'Media', 'Matter' and 'Meaning', are related in a triangular system, or spectrum, which has many levels within itself and recedes to a point (the absolute):

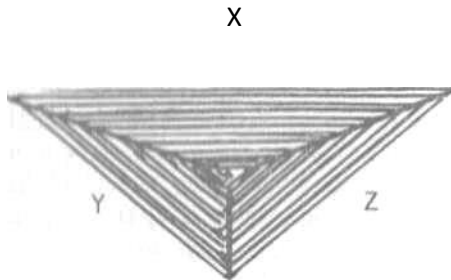


Fig. 2

Real control over thought and action—necessary if the form that is devised is to be truly appropriate—implies making Media + Matter meaningful; i.e.

Discerning/Producing/Realizing Factor X (Meaning) from the corresponding factors Y and Z in the 'Media' and 'Matter' dimensions, at the requisite (all?) levels of the spectrum. To test the concept I have listed a hierarchy of aspects and relations of the three fundamental dimensions. (See table on pp. 168/9, first published in the Institution of Mechanical Engineers proceedings, Vol. 183, Pt. 1, No. 16.)

The three fundamental dimensions figure prominently in the F.D.M. discipline and training. They provide a means of rapidly getting to the essentials of a complex problem and, because of the character of the various levels within the spectrum, are equally suited to dealing with physical and psychological aspects. This last point will

be recognized as significant if we recall the importance, for major problem analysis, of the relationships and interplay between the problem and the problem-solver. It is naive to assume that major problems can be analysed and solved without the problem-solver's strengths and weaknesses having a major influence on the nature and quality of the solution. In, say, politics, few could doubt the truth of this, but in a field like engineering, where our attention focuses on physical laws, mathematics and engineering theory, influence and bias imposed by the problem-solver tends to escape notice. With the increasing use of computers, and the ever greater range and sophistication of theory involved in problem analysis, the demands on the total-being of the problem-solver progressively grow. Hence many of the factors and relations in the spectrum, which may appear of little importance, assume a significance in the solution of complex problems.

The problem and the problem-solver are always linked by a process in time. It is this process to which the fundamental dimensions, in any or all of their levels, are applied. The process moves quite naturally from point to point, and at each point one of the aspects and relations of the fundamental dimensions assumes a special, overriding significance. But at every point in the process the essential objective must remain the same: to make Media+Matter meaningful.

At one point in the process this can occur only if the attention is concentrated on, say, physical laws and energy conversions. At another point the problem-solver may be allowing his pride, fears or fantasies to get in the way of intelligent and appropriate action. Hence at this point the fate of the project on which he, and perhaps a whole department, is working hangs on his making a massive correction (in his control loop C) to render Media + Matter meaningful at levels which are practically all within the Personal/Psychological portion of the spectrum.

It should be noticed that I am using the word 'process' to apply to any and every part and level of the approach. The process therefore includes all calculations, speculations, strategies, tactics and individual judgments. It is just as necessary to stand outside a mathematical calculation one is making, and enquire whether Media+Matter is meaningful in the particular context and moment in time, as it is to stand outside an intuitive impulse that projects an exciting idea or suggests that some pattern of relationships is important.

ASPECTS AND RELATIONS OF THE THREE FUNDAMENTAL DIMENSIONS



METAPHYSICAL/PHYSICAL			PERSONAL/PSYCHOLOGICAL		
MEDIA (Factor Y)	MEANING (Factor X)	MATTER (Factor Z)	MEDIA (Factor Y)	MEANING (Factor X)	MATTER (Factor Z)
Ref.			Ref.		
1. Eternal	Existential	Temporal	51. Ground	Realization	Expression
2. Invisible	Intelligible	Visible	52. Being	Knowing	Doing
3. Spiritual	Intellectual	Sensual	53. Psychic	Psychological	Physical
4. Noosphere	Biosphere	Earth	54. Spirit	Mind	Body
5. Infinite	Act	Finite	55. Will	Mind	Organism
6. Transfinite	Reality	Existence	56. The Self	The Ego	The Machine
7. Omnipotent	Vision of End	Humanity	57. Affective	Intellect	Sensory-Motor
8. Origins	Destiny	History	58. Agape	I—Thou	Eros
9. Unity	Coherence	Multiplicity	59. Id	Personality	Persona
10. Macrocosm	Milieu	Microcosm	60. Independent	Autonomic	Dependent
11. Complementary	Completion	Composition	61. Stimuli	Strategy	Response
12. Void	Cosmos	Crystallized	62. Input	Feedback	Output
13. Potential	Energia	Actual	63. Unconscious	Conscious	Subconscious
14. Transcendental	Synergy	Natural	64. Creative	Conscious	Sensitize
15. Signal	Information	Display	65. Unexpected	Link	Familiar
16. Physical Process	Physical Law	Physical Object	66. Archetypes	Interpretation	Programme
17. Unknown	Understanding	Known	67. Dream	Recognition	Daydream
18. Uncertain	Probability	Certain	68. Spontaneity	Creative Insight	Technique
19. Phenomenon	Physical Concept	Physical Property	69. Madness	Assessment	Precedence
20. Life	Synthesis	Antithesis	70. Myth	Truth	Theory
21. Cause	Connection	Symptom	71. Mysticism	Morals	Ethics
22. Source	Significance	Measurement	72. Fantasy	Value	Formulae
23. Quality	Substance	Quantity	73. Elastic	Transformation	Rigid
24. Fundamental	Design	Method	74. Discord	Harmony	Schemata
25. Problem	Optimization	Solution	75. Conflict	Reconciliation	Acceptance
26. Need	Fit	Form	76. Mental Vacuum	Mental Image	Mental Data
27. Need	Appropriateness	Form	77. Aptitude	Learning	Practice
28. Environment	Function	Operation	78. Feel	Think	Do
29. Unstructured	Reciprocity	Structured	79. Urge	Decision	Action
30. Simplicity	Organization	Complexity	80. Hope	Ideal	Effort
31. Etherial	Abstract	Concrete	81. Desire	Discipline	Drill
32. Forces	Essence	Behaviour	82. Mood	Manipulation	Memory
33. Instability	Control	Stability	83. Empathy	Objectivity	Observation
34. Dynamic	Emergent	Static	84. Trust	Proof	Belief
35. Energy	Directive	Material	85. Receptivity	Resolution	Recall
36. Energy	Motion	Mass	86. Openness	Understanding	Discovery
37. Nucleus	Field	Particles	87. Stillness	Integrity	Impressions
38. Transmitter	Content	Receiver	88. Listening	Perceiving	Sensing
39. Life	Vital Experience	Existence	89. Awareness	Consciousness	Reactivity
40. Free	Purpose	Constrained	90. Inspiration	Insight	Intuition
41. Germination	Evolution	Change	91. Involvement	Appreciation	Identification
42. Corpusculization	Metamorphosis	Complexification	92. Babel	Message	Language
43. Growth	Renewal	Decay	93. Impressions	Analogues	Examples
44. Future	Present	Past	94. Metaphysics	Models	Mirrors
45. Possible	Viable	Probable	95. Energies	Achievement	Work
46. Dissatisfaction	Progress	Alterations	96. Aptitude	Accomplishment	Abilities
47. Criteria	Objectives	Constraints	97. Catalysts	Controls	Directors
48. Failure	Diagnosis	Model	98. Vision	Judgement	Knowledge
49. Pre-existing	Responsibility	Predetermined	99. Imagination	Intelligence	Hindsight
50. Situation	Self	System	100. Concepts	Truth	Percepts

Note: Real control implies making Media+Matter Meaningful, i.e. Discerning/Producing/Realizing Factor X from the corresponding factors Y and Z in the 'Media' and 'Matter' dimensions, at the appropriate (all?) levels. Real Control implies minimizing the mismatch between the X, Y, and Z dimensions.

The Concepts 'Media', 'Matter' and 'Meaning'

I have been using the words Media, Matter and Meaning as though their meaning were self-evident. Perhaps the list of aspects and relations of the three fundamental dimensions will have helped you to obtain some impression of the meaning I wished to convey. The three concepts are in fact rich in content, but the content is homogeneous rather than an aggregate of essentially differing elements. The splitting of a spectrum into elements is merely for convenience of testing the overall concept and to make its application easier.

'Matter' includes everything that can be apprehended with the normal senses of sight, hearing, smell, taste, touch, etc.; also everything, external or internal, which arranges itself into perceivable systems or forms of organization. Matter includes everything that can actually be observed, measured and tested with or without the equipment of a scientific laboratory.

'Media' relates to a realm that is invisible to the senses but readily accessible to a disciplined intuition and imagination. I believe that this realm is just as real as the realm of Matter and that it is the home and origin of the forces, movements, and complexes of needs, which ultimately decide the form Matter has to take. In the natural world I believe that Media interpenetrates and structures Matter and determines the course of the evolutionary processes. In the man-made world Media is an active component whose effects are apparent in proportion to the extent that man has learned to use his 'inner' senses along with his external ones. Let it be noted that it is possible to use these 'inner' sense at least as inefficiently as the external ones, hence concepts, visions and other imaginative constructs may or may not be an accurate portrayal of Media as it applies to a particular problem at a moment in time.

It is also important to note that the need for *accuracy* in detection of Media increases as problems go up in the scale of magnitude and complexity. The use of social surveys and large scale market and operational research is to no avail if all that such surveys detect and manipulate is Matter. The lone individual who is dedicated to his job, and who has been immersed in the total milieu appertaining to it over a long period, is much more likely to detect Media which has to be taken into account if the project is to be successful. Such a person will of course inevitably have made many human contacts and will take note of their comments and experiences. He is also likely to be well read and to have observed products and processes of many kinds; but he will use

such data only as a background to his thinking, and as a set of signs and symbols for detecting and interpreting Media.

The conditions under which Media can be detected accurately have an important place in the F.D.M. discipline and training. The ideal conditions, which would produce a continuous and clear picture of Media, are not often achieved but they can be readily defined and used as standards that test the quality of thinking. These ideal conditions require that the interests of the problem-solver are totally committed to solving the problem. He must be intent on recognizing all the factors and relationships involved, and hold back any tendency to jump to premature conclusions as to what is needed. He must, in fact, allow his entire attention to be focused on discerning the *total* need, however demanding such an experience on his intellect and nervous energies. He must become completely tuned to the demands of the total problem, including demands from areas which might at first seem insignificant. There has to be a continuing act of *will* that freely chooses to bear the strain that the process imposes—particularly the strain arising from uncertainties. This act of will must be selfless (using 'self' in the egocentric sense of the word), and must be intent on discovering what is really needed, as opposed to what one might wish to produce, or believe to be politically expedient. The act of will must be coupled with integrity of a high order and—if I may be pardoned for using the term—must represent what I can only describe as an act of love. Such conditions are undoubtedly met by the great creators in any field. They are a vital part of the real secret of their genius. In response to such a predisposition Media continuously reveals itself and interpenetrates the corresponding Matter components in a manner which is entirely natural. It is simply a way of life that is at once highly productive and highly satisfying.

In F.D.M. training special care is taken to detect whether or not the will is engaged in the problem, and to assess the object and quality of this act of willing. When the will is properly aligned—even if only for short intervals—there is never a lack of valuable concepts flowing from the Media dimension. Generally such occurrences tend to be intermittent, and are often separated by long spells of ineffective mental actions, annoyance, idleness or totally 'Matter-oriented' thought. Hence it is periodically necessary to make a definite act, not only to detect Media or to recognize Matter, but to use reason to make Media+Matter meaningful. In ideal conditions this is a natural operation; but more often than not it has to be applied deliberately. To return to the simple cybernetic element, the operation of consciously attempting to make Media+Matter meaningful becomes a major component of the control (C).

The meaning of Meaning can remain consistent irrespective of its special sphere of application at the particular moment. I am well aware that philosophers have argued about the meaning of Meaning down the ages, and that they have failed to reach agreement, but this should not be taken to prove that, for practical purposes at least, the concept cannot be an eminently useful one. To argue about a concept is entirely different from possessing and using it. Arguments and reflection are valuable for producing and perfecting a concept; but to decide whether it actually possesses substance, one has to harness it to a practical purpose. One is then soon left in little doubt.

Man's creations cannot possess meaning if they contravene the laws of nature and, more particularly, if they disregard the needs of humanity. Creations which are not in the best interests of those whom they affect, lack some measure of meaning, and their forms are therefore not truly appropriate. To strive for fullness of meaning in every element of a system or product may seem to be asking too much. It is actually little more difficult a discipline than a Value Analyst's conscientious striving to obtain 'value'. But whereas the Value Analyst's concept of 'value' is usually oriented only to making savings and reducing 'waste', the concept of meaning focuses attention on satisfying real needs and generating products of high intrinsic worth.

The Concepts of Situation, Self and System

At the mid-point of the selected aspects of the Media, Meaning and Matter spectrum I have identified three sub-concepts which are used extensively in the F.D.M. discipline and training. I have named these 'Situation', 'Self' and 'System'. These three sub-concepts (which are always applied within the framework of the total concept), have proved to be very convenient, particularly in the tackling of problems of management and organization, and for special studies such as those concerned with planning standardization programmes and the more efficient deployment of resources of a department or a group.

In such studies part of the meaning of the term 'System' is probably obvious. It embraces all of the formal organization, policies, procedures, communication arrangements and other externally imposed constraints that have become the accepted practice for motivating, regulating and co-ordinating the activities of persons who are engaged in common or complementary pursuits. A less obvious part of the concept of System, as applied in this area, concerns the routines and everyday

practices with which the individual has identified strongly, and which may well have been largely of his own devising. These are called 'System' because of their predictable, and possibly stereotyped, nature. Like the externally imposed System they may well be doing more harm than good, particularly if they have not been subjected to careful scrutiny for a long time, or if circumstances have been changing rapidly.

The sub-concept 'Situation' is used for the total matrix of circumstances, its directions and its modes of change. As far as possible the Situation (which is 'Media' and therefore not directly accessible to perception) is separated from the surface details which belong to the 'Matter' dimension. This can be a difficult mental discipline to acquire, particularly when one is studying, say, one's own department and has for a long time previously been deeply involved in its politics and practices. One has to learn how—in one sense—to take oneself and one's own desires and prejudices out of the equation whilst, in quite a different sense, seeing through them to the needs which legitimately require attention.

The sub-concept 'Self', in such a context, serves to focus attention on those changes that would increase personal responsibility, and also the opportunities for intelligent and appropriate thought and action on the part of everyone involved in the activities. When working outwards from this sub-concept to make Media+Matter meaningful, the balance of existing Self-System components is likely to be changed—with most beneficial results.