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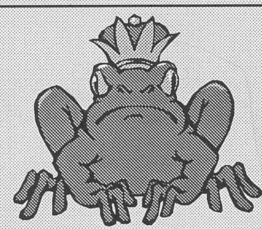
SUMMARIES

FOUR BOOKS ON COMPLEXITY



- **1976 SOCIETAL SYSTEMS**: Planning, Policy, and Complexity
- **1994 A SCIENCE OF GENERIC DESIGN** (2nd Ed.): Managing Complexity Through Systems Design
- **1994 A HANDBOOK OF INTERACTIVE MANAGEMENT**
- **1995 THE WORK PROGRAM OF COMPLEXITY:** From Origins to Outcomes

John N. Warfield
October, 1995

INTERRELATIONS AMONG THE FOUR BOOKS

The book titled **SOCIETAL SYSTEMS** helps illuminate the other three books. This book contains the mathematical theory of Interpretive Structural Modeling (ISM). Understanding of the ISM mathematical process theory **is not required** to understand references to ISM in the other three books, but such understanding **is required** for someone who wishes to write ISM software.

The book **THE WORK PROGRAM OF COMPLEXITY** provides theoretical underpinning on the subject of complexity, which is relevant to, and illuminates, the two books published by the Iowa State University Press. This book also particularizes concerns about the demands of complexity as they relate broadly to various high-level application areas.

The book **A SCIENCE OF GENERIC DESIGN** provides a theoretical basis for the practitioner-oriented book **A HANDBOOK OF INTERACTIVE MANAGEMENT**. The **HANDBOOK OF INTERACTIVE MANAGEMENT** provides the information that the potential client or practitioners needs to know about the subject. It can be read, without reading any of the other books, in order to learn how to practice Interactive Management (IM). Still anyone who is interested in the theoretical base for IM could benefit from reading **all three of the other books, or any one of them singly.**

John N. Warfield
October, 1995

SOCIETAL SYSTEMS: PLANNING, POLICY, AND COMPLEXITY[1]

A SUMMARY, CHAPTER BY CHAPTER

This book is primarily about methodology for coping with complexity. Conventional techniques for coping with complexity are unsatisfactory. The book is addressed primarily to that audience who will have some capacity to advance the practical use of the methodology, and contribute to its increasing usefulness.

The book introduces the theory of Interpretive Structural Modeling (ISM). Two types of theory underlie ISM. One is the mathematical Theory of Relations, introduced in 1847 by Augustus DeMorgan. The other is behavioral science, as it relates to group processes; which includes contributions from anthropology, sociology, and psychology.

ISM is a process for effective guidance and sequencing of group work aimed at structuring complexity so it can be understood and, therefore, faced squarely. Structuring of complexity may frequently be all that is needed to eliminate complexity.

Early applications of ISM to societal problems are described, and an appendix illustrates why it is needed, to displace ordinary group processes that produce poor outcomes.

John N. Warfield
October, 1995

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[1] John N. Warfield (1976), **SOCIETAL SYSTEMS: PLANNING, POLICY, AND COMPLEXITY**, New York: Wiley Interscience.

TITLE OF BOOK: SOCIETAL SYSTEMS
Page 1 of 4

CHAPTER 1 SOCIETAL PROBLEMS	CHAPTER 2 THE NATURE OF COLLECTIVE EXPLORATION	CHAPTER 3 THE ORGANIZED CONDUCT OF INQUIRY	CHAPTER 4 POLICYMAKING	CHAPTER 5 PLANNING AND MANAGEMENT
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• Are we living in a time of social crisis? • What is the state of the art in solving societal problems?	• What is the current state of collective exploration; i.e., group problem-solving? • What is required to become effective in resolving complex societal problems? • What concept provides a proper scientific basis for a generally applicable theory of complex-problem-solving?	• What is known about group work? • What is the natural group developmental sequence? • What are inherent limits to mental activity? • How should groups be organized for productive effort?	• How has policymaking been viewed by scholars and practitioners? • What are the six methods used to study policy-making? • What is metapolicy? • What constraints affect policy design? • How can the effects of constraints be diminished?	• What are the purposes of planning? • What should a plan contain? • What is the purpose of Unified Program Planning (UPP)? • What is Unified Program Planning? • What linkages does UPP represent?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
Prominent viewpoints in the early 1970s concerning societal problems are quoted. A process that combines situational differentiation and integration is required to enable appropriate action to be taken to resolve major issues.	Science has not yet adapted methods of inquiry to the need for collective, integrative human effort. For purposes of integration, idea management is a generic concept that requires elaboration.	Various results from the study of groups point to directions that can lead to greatly improved group work. Knowing what to avoid in enabling group work may be even more important than knowing what to promote.	Policymaking can be greatly improved. A major need is for appropriate metapolicy, i.e., policy for how to make policy. Behavioral constraints, supportive technology, and profiling metapolicy all ofter creative directions to improve policymaking.	Four propositions are given for effective management. Methods for integrating a variety of objectives are discussed. Unified Program Planning is defined, as a system that produces a representation involving a set of linked matrix patterns.

TITLE OF BOOK: SOCIETAL SYSTEMS

CHAPTER 6	CHAPTER 7	CHAPTER 8	CHAPTER 9	CHAPTER 10
SYSTEMS	COMPLEXITY AND STRUCTURE	BOOLEAN ALGEBRA, SETS, AND BINARY RELATIONS	BINARY MATRICES AND MATRIX MODELS	DIGRAPHS, DIGRAPH MAPS, AND DIGRAPH MODELS
PRIMARY QUESTIONS RAISED	PRIMARY QUESTIONS RAISED	PRIMARY QUESTIONS RAISED	PRIMARY QUESTIONS RAISED	PRIMARY QUESTIONS RAISED
• Is there any suitable framework for systems engineering? • What is the Hall Activity Matrix? • What is meant by "Systems Engineering Logic"? • What kind of people are "systems people"?	• What is the nature of structural modeling? • What is the purpose of Interpretive Structural Modeling (ISM)? • What is ISM? • How is ISM carried out?	• What mathematics underlies ISM? • What is Boolean Algebra? • What are Boolean recursion equations? • How are Boolean inequalities "solved"? • What are sets? partitions? binary relations? lattices?	• What is a matrix? binary matrix? block matrix? relation partition? binary matrix model? reachability matrix? inclusion matrix? subordination matrix? • What is interconnection theory? implication matrix? inference opportunity? diagonalized matrix?	• What is a digraph? a digraph model? a hierarchical digraph? a condensation digraph? a skeleton digraph? a Kuratowski graph? • How are skeleton digraph maps derived from reachability matrices?
ABSTRACT OF CHAPTER	ABSTRACT OF CHAPTER	ABSTRACT OF CHAPTER	ABSTRACT OF CHAPTER	ABSTRACT OF CHAPTER
A set of views on systems held by prominent people is presented. The Hall Activity Matrix is discussed as a framework for systems engineering. Value system design is described, and requirements for systems thinkers are outlined.	The connection between complexity and structure is discussed, and the potential value of structural modeling is described. Some mathematical and philosophical background is provided for modeling, and a process chart for Interpretive Structural Modeling is given.	The theory of Boolean algebra, sets, and binary relations is reconstructed to meet the needs of integration of these mathematical domains with others, by providing rigorous definitions of these concepts that are suitable for integration.	The theory of binary matrices and binary matrix models is reconstructed to meet the needs of integration of these mathematical domains with others, by providing rigorous definitions of these concepts that are suitable for integration.	The theory of digraphs, digraph maps, and digraph models is reconstructed to meet the needs of integration of these mathematical domains with others, by providing rigorous definitions of these concepts that are suitable for integration.

TITLE OF BOOK: SOCIETAL SYSTEMS

CHAPTER 11 STRUCTURE AND COMPLEXITY	CHAPTER 12 TRANSITIVE EMBEDDING	CHAPTER 13 CYCLES	CHAPTER 14 INTERPRETIVE STRUCTURAL MODELING	CHAPTER 15 INTENT STRUCTURES, IMPACT STRUCTURES, COALITIONS
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What are the basic structural concepts? • What difficulties are resolved in the ISM process? • What is meant by "going from mental model to structure"? • What are "transitive contextual relations"?	• What is "transitive embedding"? • What is the "coupling method" for model construction? • What is the "scanning method" for model construction? • What is "weighted embedding"?	• What are cycles? • How is weighted embedding carried out? • What are geodetic cycles? • Why are geodetic cycles valuable in inquiry? • How are geodetic cycles identified? • What is a hierarchy of geodetic cycle sets?	• What is the major event sequence in ISM? • What kind of leadership is needed for ISM work? • Which embedding method is best? • How are structural models interpreted and amended?	• How is ISM particularized to various structural types? • What is an intent structure? an impact structure? • How are intent structures developed? • How can social units be represented? • What is coalition analysis?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
Basic structural concepts are introduced, and related to complexity. Transitions from mental models to structures are described, and transitive relationships are introduced as fundamental.	Transitive embedding refers to a process for transforming a collection of individual mental models into group products that reflect the integrated knowledge of the members of the group.	Cycles are defined, and ways of interpreting them are given. Geodetic cyles are defined, and a mode of computing a learning strategy based upon them is given.	Interpretive Structural Modeling (ISM) is presented as a collection of algorithms designed to facilitate group interaction, learning, structuring, representations of patterns, amendments of structures, and interpretation of complex issues.	Several types of interpretive structural models are described, and examples of their use are given: intent structures, impact structures, cycles, and integrated structures that support coalitions.

CHAPTER 16 PREFERENCE STRUCTURES, DECISION TREES, AND DELTA CHARTS	CHAPTER 17 APPLICATIONS	APPENDIX
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• How was ISM used in an urban prioritization case? • What are decision trees? DELTA charts? • What is "naive preference"?	• What applications have been made of ISM? • What social unit studies have been done? • What other methodologies can ISM enhance?	• How does a United Nations case study show the significance of ISM? • What does the UN case study suggest be done in the future?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF APPENDIX**
Several types of interpretive structural models are described, and examples of their use are given: preference structures, decision trees, and DELTA Charts.	Applications of ISM to the study of several problematic situations are presented: child learning disabilities, neighborhood safety, urban system studies, the Sahel region of Africa, and world problems.	Proposals for the Second United Nations Development Decade are criticized, and it shown how these proposals lack structural integrity of the type that could have been provided by appropriate use of ISM.

A SCIENCE OF GENERIC DESIGN[2]

A SUMMARY, CHAPTER BY CHAPTER

Generic design refers to the development of outcomes that necessarily are present in the design of anything. Specific design refers to the development of outcomes that necessarily are present for a single design, or for members of a small class of designs.

When design aims to resolve complexity, the generic outcomes may often affect thousands or millions of people; hence the route to their development should be based in a science that is responsive to the demands of complexity.

Generic design science is such a science. It incorporates the foundational, theoretical, and methodological components that any science ought to exhibit (if only for purposes of facilitating its integration with other sciences, when aggregation is needed to serve applications). Examples of applications are presented.

Because it offers transparency, and evaluative criteria, it is well-positioned for assessment and improvement. Because it offers Laws of Design, it gives focus to constraints that will, if allowed to do so, degrade design activity, and lead to disasters of the type mentioned in the early chapters.

John N. Warfield
October, 1995

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[2] John N. Warfield (1994), **A SCIENCE OF GENERIC DESIGN: MANAGING COMPLEXITY THROUGH SYSTEMS DESIGN**, Second Edition, Ames, IA: The Iowa State University Press.

TITLE OF BOOK: A SCIENCE OF GENERIC DESIGN

CHAPTER 1 A CONTEXT FOR A SCIENCE OF GENERIC DESIGN	CHAPTER 2 UNIVERSAL PRIORS TO SCIENCE	CHAPTER 3 A DOMAIN OF SCIENCE MODEL	CHAPTER 4 MANAGING COMPLEXITY THROUGH SYSTEMS DESIGN	CHAPTER 5 FOUNDATIONS OF THE SCIENCE
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What disaster areas and what data show the need for designing large-scale systems instead of installing ad hoc versions? • How might large-scale system design be subjected to discipline? • What is the role of science in correcting bad situations?	• What quality-control conditions need to be imposed on all sciences? • What theories and/or laws, and/or historical developments enable quality control needs to be identified? • What help arises from DeMorgan and Peirce? • Why is a model of science needed?	• How should a science be organized? • Why should it be so organized? • What existing sciences are organized in this way? • How will the Domain of Science Model be used to discipline development of generic design science?	• How does complexity escalate? • Why is capability to design critical in managing complexity? • What detractors prevent effective design work? • What enhancers can enable effective design work?	• What postulates underlie the generic design science? • To what criteria must generic design science be responsive? Why? • How can the foundations of a science be evaluated?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
Our society is witnessing the development of very large systems, which are poorly designed and not well understood. A science of generic design will provide for system design and understanding.	Universal Priors underpin all science. These are: the human being, language, reasoning through relationships, and archival representation. Every science should account for them explicitly in its foundations in the manner illustrated here.	Every science should be disciplined by the Domain of Science Model, in order to assist in integration among the sciences, and to structure the logic of the sciences for its proper understanding.	The principal utility of a science of generic design is its contribution to the management of complexity through systems design. Through it, detractors are nullified, and enhancers are incorporated into human behavior.	The foundations of the science include postulates of: the human being, language, reasoning through relationships, archival representation, the design situation, and the design process. Evaluation involves purpose, responsiveness, and utility.

TITLE OF BOOK: A SCIENCE OF GENERIC DESIGN

CHAPTER 6 THEORY OF THE SCIENCE	CHAPTER 7 METHODOLOGY OF THE SCIENCE	CHAPTER 8 ENVIRONMENT AND ROLES OF THE SCIENCE	CHAPTER 9 PRODUCTS FROM THE PRACTICE	CHAPTER 10 APPLICATIONS OF THE SCIENCE
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What are the functions that theory must perform? • What is the theory of dimensionality? • What is a Representation? • What laws and principles are involved in generic design theory?	• What is idea management? How does it relate to methodology? • Why is graphics language important? • What processes comprise the Consensus Methodologies?	• In what environment should generic design science be practiced? • What roles should be involved in the practice? • What are some locations where the practice has been installed? • What does the working environment look like?	• What products accrue from the practice of generic design? • What are application structural types?	• What kinds of applications of generic design science have been carried out? Where? by whom? With what outcomes?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
Theory explains key concepts and anticipates the consequences for choice and nature of methodology. Dimensionality of a design disciplines modes of representation and responds to the Law of Requisite Variety.	Methodology consists of prescribed process components that are responsive to the demands of complexity. Founded in idea management, methodology involves generation, clarification, structuring, interpreting, and amending. Specific products of methodology are identified and their purposes explained.	It is inappropriate to try to work with complexity in ordinary environments. The definition of roles and the working environment makes it possible to plan for success in applying the science of generic design.	Both tangible and intangible products arise from the practice of generic design. Tangible products include: sets, relationship maps, chosen application structural types, and the mastery of the logic of large-scale systems.	Applications of the science to education, economic development, human service systems, program management, and industrial quality control are described.

TITLE OF BOOK: A SCIENCE OF GENERIC DESIGN
Page 3 of 4

APPENDIX 1 RELATIONS, LATTICES, STRUCTURAL TYPES, STRUCTURAL METRICS	APPENDIX 2 A GRAPHICALLY-INTEGRATED LANGUAGE SYSTEM	APPENDIX 3 CONSENSUS METHODOLOGIES	APPENDIX 4 AUTOMATION OF DOCUMENTATION	APPENDIX 5 DATA FROM APPLICATIONS
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What mathematics underlies the generic design science? •Through what means and based on what theory can relational patterns be constructed and interpreted? • What are the application structural types?	• What is a graphically-integrated language system, and why could it be very useful? • What are the layers in such a language system? • What are the standard symbols that could be used in such a system?	• What are the "Consensus Methodologies"? • How were they selected? • How are they described?	• How can the documentation of group work be automated?	• What data are available from applications of the generic design science? • What do the data reveal? • What Laws arise from consideration of the empirical evidence?
ABSTRACT OF APPENDIX	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**
Mathematical concepts associated with the science include: relations, partitions, digraphs, maps, and lattices. Structural metrics make possible comparisons of relative complexity.	A graphically-integrated language offers advantages in representing complexity. Such a language can have well-defined graphic symbols, and layers of representation of differing sophistication.	Seven consensus methodologies collectively form a set that is adequate to encompass the requirements of idea management aimed at system design and understanding.	Documentation of group work involving complexity can ultimately be automated by taking advantage of computer assistance in developing and documenting the work.	Data are presented from a collection of applications, shedding light on what can be expected in applying the generic design science.

TITLE OF BOOK: A SCIENCE OF GENERIC DESIGN

APPENDIX 6 EXPERIENCE IN TEACHING GENERIC DESIGN SCIENCE	APPENDIX 7 TRIGGERING QUESTIONS, RELATIONSHIPS, AND GENERIC QUESTIONS	APPENDIX 8 DEVELOPING A DESIGN CULTURE IN HIGHER EDUCATION	POSTSCRIPT: ISSUES AND RESPONSES
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• Where has generic design science been taught? To whom? • What are some representative outcomes from student work?	• What are triggering questions, and how are they designed? • What are generic questions, and how are they designed? • What purposes do these questions serve? • How do they relate to the Consensus Methodologies?	• Who has studied the development of a design culture in higher education? • What were the identified inhibitors? • What kind of problematique is involved? • What action options are available? • What response can be designed to inhibitors?	• What issues do reviewers see in this book? • What are the author's responses to the reviewer-generated issues? • What is mean by "open at scale"?
ABSTRACT OF APPENDIX	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**	**ABSTRACT OF POSTSCRIPT**
Generic design science and its practice have been taught to college students. Some of the teaching methods and results are presented to show how this science can become part of a design culture in higher education.	The careful design of questions offers a very effective way to engage groups in applying the science of generic design. Triggering questions and generic questions are described and examples of them from applications are presented.	In a workshop on the Greek island of Chios, an international group of scholars studied the idea of developing a design culture in higher education, using the methods of generic design. The results are both analytical and constructive.	Reviewers of the pre-publication manuscript on A Science of Generic Design offered a variety of criticisms of the manuscript. This Postscript responds to those critiques to illuminate further the author's views and intentions.

A HANDBOOK OF INTERACTIVE MANAGEMENT[3]

A SUMMARY, CHAPTER BY CHAPTER

This Handbook presents, for the potential practitioner of Interactive Management (IM), a description of how complexity can frequently be resolved through its use.

IM is a system of management that is designed for and intended to be used intermittently in resolving complexity in organizations, through group processes augmented by supportive management practices.

This description of IM is characterized by the following attributes:

- Well-defined outcomes of its use
- Specified levels of success that can be used to plan and evaluate the work
- Three well-defined phases in its application
- Clearly specified roles and responsibilities attached to the roles
- Well-defined types of products, from which choices can be made in planning
- Clearly-defined, thoroughly-tested group processes, from which choices can be made for specific applications
- A well-designed, thoroughly-tested, special facility for conducting IM workshops
- Supporting PC-based software that has been in use in many places for more than eight years
- Detailed description of each of the three Phases: the Planning Phase, the Workshop Phase, and the Followup Phase
- Evaluation criteria that focus the work and the understanding of IM
- Comparisons of IM with other widely-used systems
- Examples of the use of IM, extending over more than a decade
- Identification of qualified practitioners

John N. Warfield
October, 1995

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[3] John N. Warfield and A. Roxana Cárdenas (1994), **A HANDBOOK OF INTERACTIVE MANAGEMENT**, The Iowa State University Press.

TITLE OF BOOK: **A HANDBOOK OF INTERACTIVE MANAGEMENT**

CHAPTER 1 WHAT IS INTERACTIVE MANAGEMENT?	**CHAPTER 2** IM OUTCOMES	**CHAPTER 3** IM SUCCESS LEVELS	**CHAPTER 4** IM PHASES	**CHAPTER 5** IM ROLES
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What is IM? • When is it used? • What is the history of its application?	• What are the three main categories of IM products? • What five functions does IM support? • What representational pattern types are produced with IM? • How is IM work focused?	• Why is "success" defined for each use of IM? • What are the five levels of success from which to choose? • How is a success level chosen?	• What are the 3 phases of IM work? • What occurs in the initial meeting between IM staff and a potential client? • What is an "IM Broker" and what does this person do? • What factors are considered in planning for IM activity?	• What roles and what role types must be filled in doing IM work? • What are special requirements on an IM facilitator? • How are the various roles in IM work defined?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
IM is a system of management designed expressly to be used for the management of complexity, in problematic situations that require significant value-added in order to succeed. It has been tested in various forms since 1973, and has been applied hundreds of times to many varieties of complex issues.	IM is aimed at definition, construction of alternative designs, and choice of a design; all aimed at ultimate resolution of a problematic situation, by reduction of complexity. It produces very substantial learning among the participants, and uses new types of representation tailored to complexity.	Success is most reliably achieved when it has been pre-defined in the light of a particular situation. Five prototypical levels have been defined to facilitate definition. A specific success level should be chosen to provide perspective on the situation, and to help assure satisfaction.	IM is always organized into three phases: Planning, Workshop, and Followup. Agreement on the aims of its use is achieved early between the IM staff and the client, who accepts the demands of complexity as reflected in the IM system.	IM Roles are defined for both the supplier of IM services and the client organization. The roles are designed to achieve specific objectives, and to provide a compatible "cast" for the IM drama. All specified roles must be filled. Role specifications are intended to provide quality control to IM use.

TITLE OF BOOK: A HANDBOOK OF INTERACTIVE MANAGEMENT Page 2 of 4				
CHAPTER 6 **IM PRODUCTS (APPLICATION STRUCTURAL TYPES)**	**CHAPTER 7** **IM PROCESSES**	**CHAPTER 8** **DEMOSOPHIA FACILITY**	**CHAPTER 9** **IM SOFTWARE**	**CHAPTER 10** **IM PLANNING PHASE (PH. 1)**
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What are the main tangible products of the use of IM? • What distinguishes these types from ordinary structural graphics?	• What are the primary operations that are carried out with ideas? • Why is generic methodology applicable to work with complexity? • What IM processes are used, and how?	• What does "Demosophia" mean? • What constitutes an appropriate working environment for dealing with complexity? Why?	• What is ISM? • Why does ISM require software? • What is the history of ISM software development? • What does the GMU DOS-based ISM PC software do?	• Why is an IM Planning Phase carried out? • What are the components of the IM Plan? • What are the 3 IM Workshop types? • What is a typical duration of an IM Workshop?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
The main products of IM are structural graphics, in which shared knowledge is organized into patterns, from which comprehensive interpretations can be developed.	All IM processes aim to assist groups in arriving at consensus interpretations of problematic situations, allowing designs to be put into practice to resolve the complexity. All the process are operations on ideas: the building blocks of analysis and synthesis for all situations.	DEMOSOPHIA, the "wisdom of the people" reflects the enabling power of the IM processes to be carried out effectively and efficiently in a facility especially designed to make high-quality group work possible.	ISM is a computer-assisted process for group structuring of logical patterns aimed at "chunking" component ideas into interpretable patterns that diminish complexity and facilitate consensus. Software assistance is required to construct the patterns. A tested PC version exists.	The IM Planning Phase is intended to clear away conceptual underbrush, so that when precious group time becomes available it is most advantageously used, in order to avoid many dysfunctional practices commonly encountered in group work. An IM Workshop can produce Definition, Alternative Designs, or a final Design Choice.

TITLE OF BOOK: A HANDBOOK OF INTERACTIVE MANAGEMENT Page 3 of 4				
CHAPTER 11 **IM WORKSHOP PHASE (PH. 2)**	**CHAPTER 12** **IM FOLLOWUP PHASE (PH. 3)**	**CHAPTER 13** **EVALUATION CRITERIA FOR IM**	**CHAPTER 14** **COMPARING IM WITH METHODS OF JAPAN**	**APPENDIX 1** **EXECUTIVE OVERVIEW OF IM**
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What are the goals and components of an IM Workshop? • What should be avoided in carrying out an IM Workshop? • What factors should be managed carefully in documenting an IM Workshop?	• What should the Client and the Broker consider in doing a Followup Phase? • What is typically involved in the Followup Phase after a Definition Workshop? after a Design of Alternatives Workshop?	• What should evaluators of IM consider, under what circumstances? • What kinds of errors decrease evaluation scores for IM activity?	• What methods commonly attributed to Japan are compared with IM? • What five information-quality factors are applied in doing a comparison? • What process can be used to produce all seven of the qualitative relational diagrams?	• Can IM accommodate both standardization and flexibility? How? • Why should quality-controlled qualitative work precede quantitative work?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF APPENDIX**
The essential components of an IM Workshop are described, which are designed to achieve a collection of stated generic goals. This discussion lays a basis for evaluating a Workshop and for an avoidance strategy aimed at preventing major mistakes in the work and its reporting.	Use of IM should conclude when it is no longer needed. Since intermediate results are usually required to make that determination, the Followup Phase will not be considered in any detail until what has been accomplished is thoroughly understood. Termination, Implementation, or Iteration of the phases is the normal choice set.	Evaluation criteria strive to help assure simultaneous satisfaction of concerns for: the Client, the Reputation of IM, the Practitioners, the Participants, and Society as a whole. Each phase is separately evaluated, depending on the specific success level sought and the type of Workshop being done.	The so-called 7-M tools and 7-QC tools often used in Japan are almost never described in terms of any scientific foundation; but rather in terms of "how to do them". Quality Function Deployment is similarly treated. Generic properties are not recognized in this system, so when compared with IM these practices lose some of their proclaimed glitter.	This Appendix strives to provide, for a busy executive, an overview of IM that is neither highly technical nor highly oversimplified; but rather focuses on criteria for success, factors to consider, types of outcomes to be expected, need for a specially-designed facility, and a success orientation.

TITLE OF BOOK: A HANDBOOK OF INTERACTIVE MANAGEMENT Page 4 of 4				
APPENDIX 2 GMU ISM SOFTWARE	**APPENDIX 3** GROUP FACILITATION	**APPENDIX 4** CASE STUDY	**APPENDIX 5** QUALIFIED IM PRACTITIONERS	**APPENDIX 6** THE IM WORKSHOP PLAN
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What software is needed to use the ISM process? • What are the 3 major commands that are available, and why are they chosen? • What is required to operate the GMU DOS-based PC ISM Software? • What steps have to be taken to construct prototypical patterns?	• When is IM facilitation appropriate? • What difficulties are commonly encountered by groups that strive to work together in problematic situations? • How can science help with group difficulties? • How can IM help with group difficulties? • What are the attributes of a bad facilitator? • How can one become an IM facilitator?	• What was done in a typical case of an IM Workshop? • How is a Problematique interpreted?	• What individuals have established their capability to plan and carry out IM Workshops? • How can these individuals be contacted? • How many years have they been doing IM work?	• How can the context, content, and process of an IM Workshop be taken into account in checking an IM Workshop Plan for completeness and quality? • What is typically included in an IM Workshop Plan?
ABSTRACT OF APPENDIX	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**
Detailed examples of use of the GMU DOS-based ISM PC software are given to walk a potential user through application of the 3 major commands; and to show simple examples of the types of structures produced from each command.	IM is normally only appropriate for use in working with complex situations, where group facilitation is essential. The IM Facilitator needs special training in IM, to become aware of what IM strives to accomplish, and to know how IM relates to many difficulties.	In a certain problematic situation, a large set of problems was generated, and the problems were placed in categories for ease of reference. Individual voting identified views on relative importance of problems. Various interpretations reveal benefits gained.	Names, addresses, and years of experience are given for qualified IM practitioners in various countries.	A check list is given to assess an IM Workshop Plan. A prototype outline for this type of Plan is given, with the relevant terms as defined in Chapter 10.

THE WORK PROGRAM OF COMPLEXITY[4]

A SUMMARY, CHAPTER BY CHAPTER

This manuscript presents what might be called a "first draft of a science of complexity". Complexity is defined as "a state of mind" in which the human mind, having been engaged in trying to understand a system, reaches the conclusion that the effort has been unsuccessful. The induced frustration comes from this experience.

The definition of complexity reflects the evident truth that if the human being were able to be all-seeing and all-comprehending, there would be no complexity. It reflects the further condition that there are systems which the human wishes to understand, and which are not understood, typically because of constraints upon the human being which cannot be overcome by the individual.

The quest to overcome the constraints leads into the domain of particpative group work, based in a reinvention of inquiry that is responsive to the demands of complexity. The demands of complexity are connected to 17 Laws of Complexity which are at work in ordinary situations.

The reinvention of inquiry is largely based in the philosophy of Charles Sanders Peirce (1839-1914), and is organized through a Behavior-Outcomes Matrix, in which the origins of complexity are recognized, and to which the system of inquiry is responsive. One index set of the matrix is behaviorally-founded in terms of constraints on the individual, on groups, and on the organization; as well as on human interaction processes. The other index set of the matrix is called The Work Program of Complexity. It involves four primary components, which are:

- Description
- Diagnosis
- Design
- Implementation

These "D3-I" Components seem to be adequate to reflect any human effort to resolve complexity, starting with the description of the system being examined, continuing with the diagnosis of what is deemed to be wrong with that system, continuing with the design of a replacement system, and reaching initial closure, terminating with the implementation of that system. If there exists no system to be described it will be appropriate to describe whatever new system is contemplated. The Work Program can be iterated as desired.

The manuscript describes the 17 Laws of Complexity, and how these Laws relate to each aspect of the two matrix indexes. The manuscript also identifies 25 Mindbugs, which are responsible for much faulty reasoning, and which promote complexity singly and (more disagreeably) collectively.

The demands of complexity are diagnosed separately for: higher education, technology innovation, leadership, and systems science. Empirical data are used to reinforce these descriptions.

Structural thinking, implemented with the aid of Interactive Management, is identified as a principal antidote to complexity, because it has a well-documented historical record of being effective in fulfilling that function.

John N. Warfield
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[4] John N. Warfield (1996), **THE WORK PROGRAM OF COMPLEXITY: FROM ORIGINS TO OUTCOMES,** draft manuscript.

TITLE OF BOOK: **THE WORK PROGRAM OF COMPLEXITY**

CHAPTER 1 REINVENTING INQUIRY	**CHAPTER 2** EXPLORING THE SEA OF KNOWLEDGE	**CHAPTER 3** MENTOMOLOGY	**CHAPTER 4** THE NATURE OF COMPLEXITY	**CHAPTER 5** STRUCTURE OF COMPLEXITY THEORY
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• Why is it necessary to reinvent inquiry? • What philosopher provided the intellectual basis for reinventing inquiry? • What is the Work Program of Complexity? • What matrix provides the overview for reinventing inquiry?	• What metaphor captures the present state of inquiry? • What presently governs organizational change? • What was philosophy, and what has it become? • How could revitalized philosophy support organizational change?	• What is mentomology? • What is a mindbug? • What are the four types of mindbugs? • What are the 25 minbugs classified to date?	• What is complexity? • How can it be diminished through learning? • What is the role of semiotics in relation to complexity? • What numerical indexes characterize complexity?	• What are the three divisions on the Scale of Complexity? • How do the Laws of Complexity interact? • How is the Behavior-Outcomes Matrix interpreted?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
The Behavior-Outcomes Matrix forms the framework for reinventing inquiry. Reinvention is required in order to meet the demands of complexity. The Work Program of Complexity consists of the production of these outcomes: Description, Diagnosis, Design, and Implementation.	The foundations of organizational change are found in high-quality philosophical thought, especially of Charles Sanders Peirce. Today's organizational practices are often responsive to superficial, metaphorical rhetoric; but good practice will involve diving deep in the Sea of Knowledge, rather than surfing.	Mentomology is the newly-discovered discipline: the study of Mindbugs. Twenty five Mindbugs are described, and some of their consequences are identified. Worst of all, Mindbugs have a habit of appearing in swarms, where their collective impact is devastating.	Complexity is a state of mind, arising out of recognition that a system being studied cannot be adequately understood. Once the mind is seen as the site of complexity, it is evident that reduction of complexity depends on learning. The learning process must be responsive to demands of complexity. Metrics help categorize the problematic situation.	The structure of complexity theory involves an understanding of the 17 Laws of Complexity that have been discovered to date. These Laws can be positioned in the Behavior-Outcome Matrix, where the connection of the Laws to human behavior and to the Work Program of Complexity is established.

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CHAPTER 6 DEMANDS OF COMPLEXITY ON WRITING AND RESEARCH	CHAPTER 7 CASE STUDY	CHAPTER 8 OUTCOMES OF SYSTEMS INQUIRY	CHAPTER 9 BEHAVIOR IN SYSTEMS INQUIRY	CHAPTER 10 COMPLEXITY AND GROUP PROCESS
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What defines the linearity of prose? • What defines the parallelism of prose? • What attributes are common in problematic situations? • What is a nonlinear structure? • What is a problematique? • How is the constraint of Procrustes eliminated?	• Who was involved in redesigning the U. S. Defense Acquisition System? • What process was used? • What statistics describe the project? • What % of problems generated could be resolved by the new design? • How was it implemented? • What challenge remains?	• What Laws relate to system description? • What Laws relate to system diagnosis? • What Laws relate to system design? • What Laws relate to implementation of a design?	• What Laws relate to the individual? • What Laws relate to the group? • What Laws relate to the organization?	• What Laws relate to process? • What demands are imposed on process by complexity? • Why does the strain of overcoming complexity fall primarily on groups, rather than on the whole organization or the isolated individual?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
Prose force-fits analysis and synthesis into linear patterns which cannot possibly express adequately the patterns of complex situations. Research contexts require graphical representations.	The U. S. Defense Acquisition System has been entirely redesigned. The design program gives a prototypical case study of how to reduce a high level of complexity to the point where a system becomes manageable.	The Laws of Complexity are related to each of the four components of The Work Program of Complexity individually, showing how the Laws impact on these components.	The Laws of Complexity are related to three of the behavioral components of the Behavior-Outcomes Matrix: the individual, the group, and the organization. Constraints are clarified as demands of complexity on behavior.	The Laws of Complexity are related to group processes, showing the demands of complexity on these processes. Many common deficiencies in group processes are illuminated by these Laws.

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CHAPTER 11 SPREADTHINK	CHAPTER 12 STRUCTURAL THINKING	CHAPTER 13 BRIEFS OF THE LAWS OF COMPLEXITY	CHAPTER 14 DEMANDS OF COMPLEXITY ON HIGHER EDUCATION	CHAPTER 15 DEMANDS OF COMPLEXITY ON TECHNOLOGY INNOVATION
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What is Spreadthink? • What Laws affect it? • What are the major consequences of it? • How are existence data obtained? • What features characterize Interactive Management Workshops? • What are recovery data?	• What evidence shows low productivity? • What is a context model of complexity? • How does semiotics interact with complexity? • How does language interact with complexity? • How does modeling relate to complexity? • What is structural thinking? • What are the benefits of structural thinking?	• What are the 17 Laws of Complexity? • How are the Laws interpreted? • Under what conditions are the Laws applicable? • Under what conditions can the Laws be circumvented? • What are the origins of the Laws? • What references offer further explanation?	• What are the demands of complexity on higher education? • Who creates conditions of complexity? • What can be brought to bear on complexity? • What criteria can be applied to involve complexity in higher education? • How can learning that diminishes complexity occur in higher education?	• What are the demands of complexity on technology innovation? • What philosophies illuminate the nature of change required?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**
Spreadthink: no matter what complex situation is explored or what individuals are involved, their individual views on the situation are "all over the map". Spreadthink is immobilizing.	Structural thinking puts over two millennia of thought about formal logic in the service of groups; and thereby enables the divisive impact of Spreadthink to be overcome.	A "brief" is given for each of the 17 Laws of Complexity, stating the Law, its origins, and references to literature, when available. An interpretation of each Law is offered.	Higher education has been completely unresponsive to the demands of complexity. With minimum reorganization, and the addition of essential infrastructure, the university can correct this situation.	Technology innovation must begin to be responsive to the demands of complexity, especially in its representations of technological systems, including software.

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CHAPTER 16 DEMANDS OF COMPLEXITY ON LEADERS	CHAPTER 17 DEMANDS OF COMPLEXITY ON SYSTEMS SCIENCE	CHAPTER 18 SUMMARY: LESSONS LEARNED	APPENDIX 1 HIGHLIGHTS OF INQUIRY RE COMPLEXITY	APPENDIX 2 THE NATURE OF SCIENCE
PRIMARY QUESTIONS RAISED	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**	**PRIMARY QUESTIONS RAISED**
• What situational attributes reflect the challenges of complexity to leaders? • What types of situations can be identified? • How is the Work Program of Complexity enabled?	• What is systems science? • How do the interrelated Laws of Complexity relate to individuals, groups, organizations, and outcomes of group work? • How should the interrelations relate to systems science?	• What are the major lessons learned in a prolonged study of complexity? • What is the history of the research program? • What occurred in the Early Period? • What occurred in the University Period? • How do lessons relate to scale? to roles? to universities? • How fundamental is ISM to coping with complexity?	• What books on complexity are recommended? • Where are the demands of complexity being met by the use of Interactive Management? • What are some example applications, done by who? • What relevant bibliographies are available? • What relevant papers and reports can be examined?	• What is the nature of science? • Why is it necessary to integrate various sciences for what purposes? • What is the Domain of Science Model, and what is its function? • What are the "Conceptual Sciences"?
ABSTRACT OF CHAPTER	**ABSTRACT OF CHAPTER**	**ABSTRACT OF CHAPTER**	**ABSTRACT OF APPENDIX**	**ABSTRACT OF APPENDIX**
Complexity demands that the leader become a process enabler.	Complexity demands that systems science become evaluative and integrative, instead of idiosyncratic and individualistically oriented.	In almost 3 decades of research on complexity, many lessons have been learned that warrant study.	The nature of science is still subject to mammoth confusion. This confusion can be alleviated by study of Charles Sanders Peirce's philosophy of science, and adoption of the Domain of Science Model as an organizing plan.	Sciences must be reorganized to facilitate integration for purposes of applications. Integration requires that each science be organized into its foundations, its theory, and its methodology. Evaluation and upgrading require feedback from applications.

OUTSIDE BACK COVER ON GREEN INDEX

ABOUT THE AUTHOR

John N. Warfield is University Professor and Director of the Institute for Advanced Study in the Integrative Sciences (IASIS) at George Mason University (GMU), a state university, in Fairfax, Virginia. IASIS is a component of the Institute of Public Policy (TIPP) at GMU.

He received the A.B. degree, the B. S. in Electrical Engineering, and the M. S. in Electrical Engineering from the University of Missouri (Columbia) in 1948, 1948, and 1949, respectively. He received the Ph. D. degree from Purdue University (West Lafayette) in 1952, majoring in electronic communications.

He has 38 years of university faculty service, of which the past 12 years have been at GMU. He has spent a total of 20 years as a faculty member in Virginia, and during that time has had the designation "eminent scholar" in the Virginia system. He has about 10 years of industrial experience: Director of Research, Wilcox Electric Company (1965-66); Senior Research Leader, Battelle Memorial Institute (1968-74); Senior Manager, Burroughs Corporation, (1983-84). This experience included research of both theoretical and experimental nature, electronic development and reliability testing of navigational equipment for jet aircraft, and management experience in overseeing research projects and industry-university contracts.

He has served as elected President of the Systems, Man, and Cybernetics Society of the Institute of Electrical and Electronics Engineers, and is a Life Fellow of that organization. He has served as elected President of the Society for General Systems Research (later renamed the International Society of Systems Sciences). He served 9 years as founding editor of Systems Research and four years as editor of the IEEE Transactions on Systems, Man, and Cybernetics.

He is the author of two U. S. patents on electronic equipment, and is the inventor of Interpretive Structural Modeling, Interactive Management, and Generic Design Science.

He is sole author of four books, co-author of another book, and co-translator of a classic German work on communication networks. He is author or co-author of over 100 papers. He is in demand as a speaker and collaborator outside the United States where his research contributions are well-known. He has presented his work on complexity in ten nations, and has taught one-week short courses in five of them.

His primary activities in the past few years have involved preparing two books for publication in 1994, authoring papers, presenting papers at conferences, teaching short courses, and serving as an information resource or an active participant in working with individuals who are seriously dedicated to improving quality, effectiveness, efficiency, communication, and organizational cultures in their various organizations. He is presently preparing a new book manuscript titled: The Work Program of Complexity: From Origins to Outcomes. Biographical sketches of Warfield can be found in American Men and Women of Science, Who's Who in Engineering, Who's Who in Frontier Science and Technology, and Who's Who in America.