








Illustrative History of MIRCE International Symposia (1992-2020)





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I	Advances in Logistics							P
		Two Day Symposium						
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I	Edited by: Dr J. Knezevic						S	I
		28/29 July 1992						
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Proceedings

Advances in Logistics

Two Day Symposium

Edited by Dr J. Knezevic

Published by: Research Centre M.I.R.C.E.
July 1992



"You must be a very brave man, Dr Knezevic, to present to the industrial world the work of Exeter and Europe's first generation of logistics students."

That was the repeated comment to my idea of having a symposium where all students on the master course in logistics engineering would be able to present their industrial project to fellow industrialists.

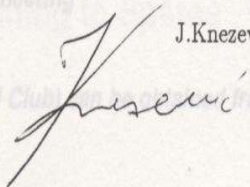
Today, when all of us are witnessing the presentations made by the students who started the course in September 1991, I can say that from early 1989 when the preparation for this course started, firmly supported by people from industry and academia, I believed in its success and contribution to the science of logistics. I feel that this symposium is not a sign of bravery, but a sign of inevitability. Even more, it is a source of pleasure for all of us, thanks to the hard work and great achievement of all the students involved, and to the support given to them by their companies, families and friends.

I feel extremely proud to be in a position to write the preface to this collection of industrial projects produced by our Master Students and an additional contribution of three papers made by research workers from our Research Centre for the Management of Industrial Reliability and Cost Effectiveness, MIRCE. At the same time I would like to use this opportunity to thank all the members of our Industrial Club led by the Board of Advisors for their continuous support as well as for chairing the sessions of this symposium. A special thanks must go to the British Aerospace Military Division for donating a prize for the best paper presented.

I hope all of you, presenters and participants will have an enjoyable and memorable time during these two days, and even more I hope the high quality of work presented will serve as a useful contribution to the science of logistics and will assist you in the day to day work. Finally, I would like to invite all of you practising logisticians to join us at Exeter University to study, research, and transform the knowledge of logistics engineering and management.

Exeter, July 1992.

J.Knezevic



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SESSION B MAINTAINABILITY

CHAIRMAN: MR MARTIN BLAZE, BAE DEFENCE

<i>The Logistics of Condition Monitoring and Diagnostics Engineering Management (COMADEM)</i>	Professor B Rao	B1
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CHAIRMAN: AIR COMMODORE MARTIN PALMER, RAF

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CHAIRMAN: MR DAVID TOMBLESON, BAE DEFENCE

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Proceedings


Advances in Logistics

International Symposium

Edited by Dr J. Knezevic

J. Knezevic
Exeter, July 1993

Published by: Research Centre M.I.R.C.E.
July 1993





Encouraged by the favourable response from participants of the first Logistics Symposium held at Exeter in 1992 to the papers presented by the our MSc students, this year I have enormous pleasure to welcome several papers written by practising engineers from UK and USA. In addition, four papers have been produced by research workers from the Research Centre for the Management of Industrial Reliability and Cost Effectiveness, MIRCE.

I feel extremely proud to be in a position to expose the research work of our first generation of Master Students to you, an undoubtedly well experienced audience, who can fully judge their merit. It is a great tribute to their own hard work coupled with continuous support coming from their companies, families and friends. It is also a great pleasure to be in position to mix the students' work with work produced by the experts from Industry. I, as course director, firmly believe that the content of our course and the methods of its delivery must be compatible with the needs and demands of practising engineers and that our students, after graduation, should be able to make a positive impact to the industrial community.

At the same time I would like to take this opportunity to thank all the members of our Industrial Club, led by the Board of Advisors for their continuous support and for chairing the sessions of this symposium.

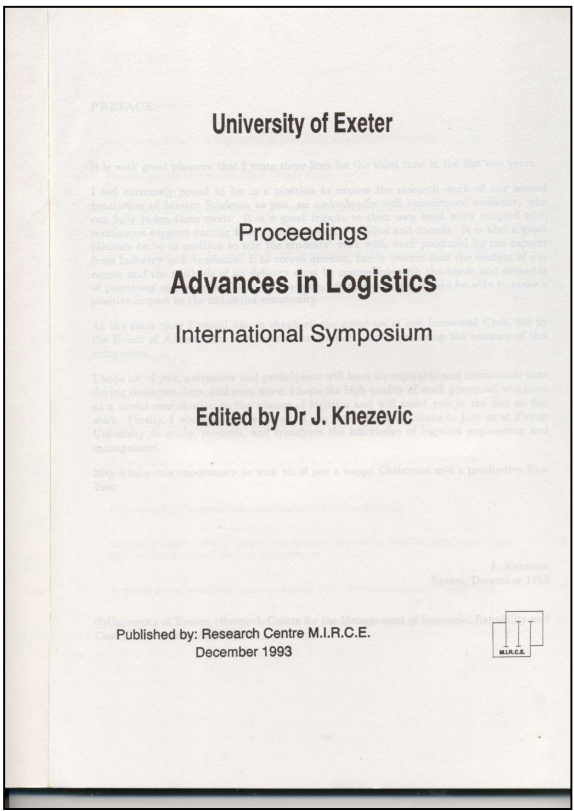
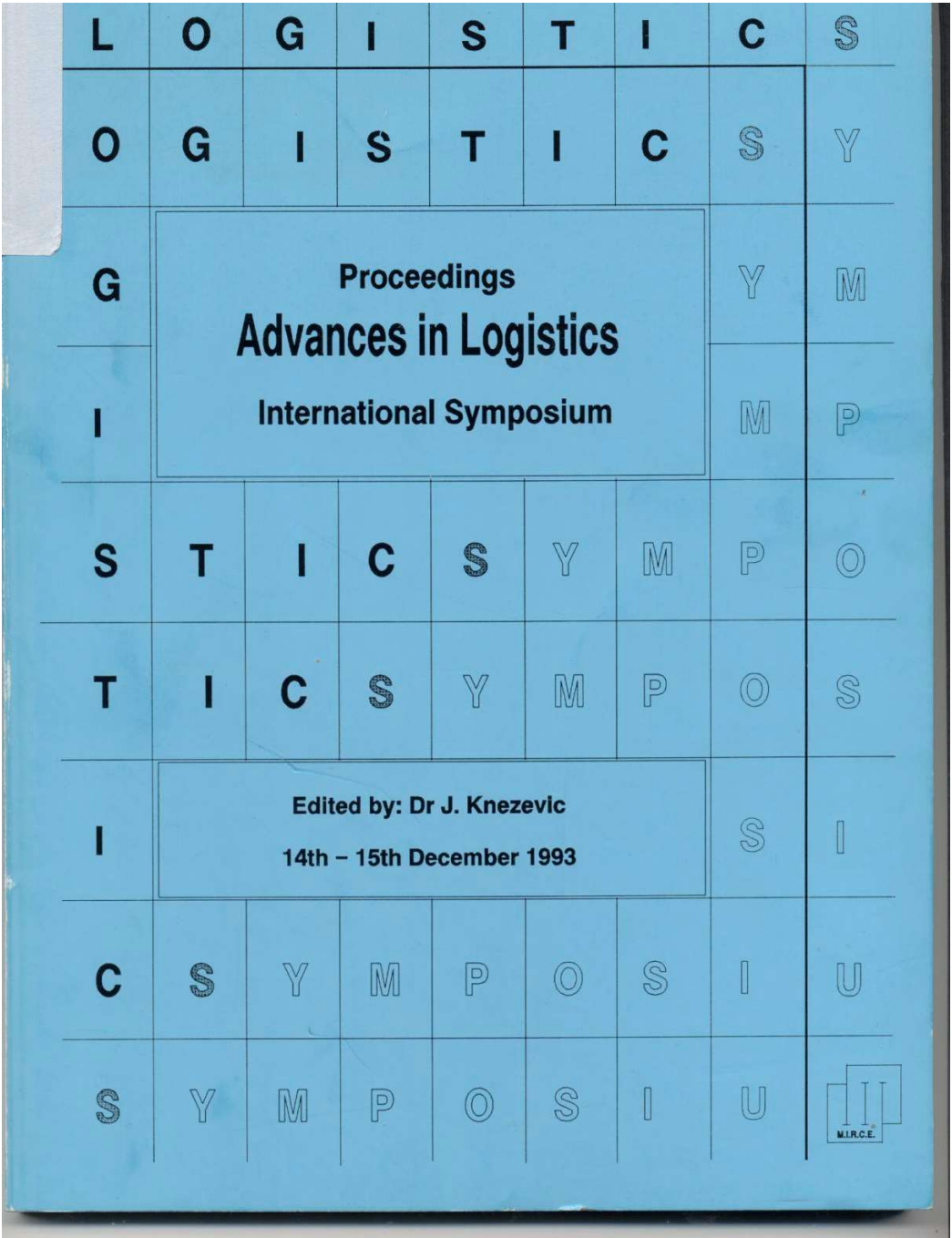
I hope all of you, presenters and participants will have an enjoyable and memorable time during these three days, and even more, I hope the high quality of work presented will serve as a useful contribution to the science of logistics and will assist you in the day to day work. Finally, I would like to invite all of you practising logisticians to join us at Exeter University to study, research, and transform the knowledge of logistics engineering and management.

J. Knezevic
Exeter, July 1993

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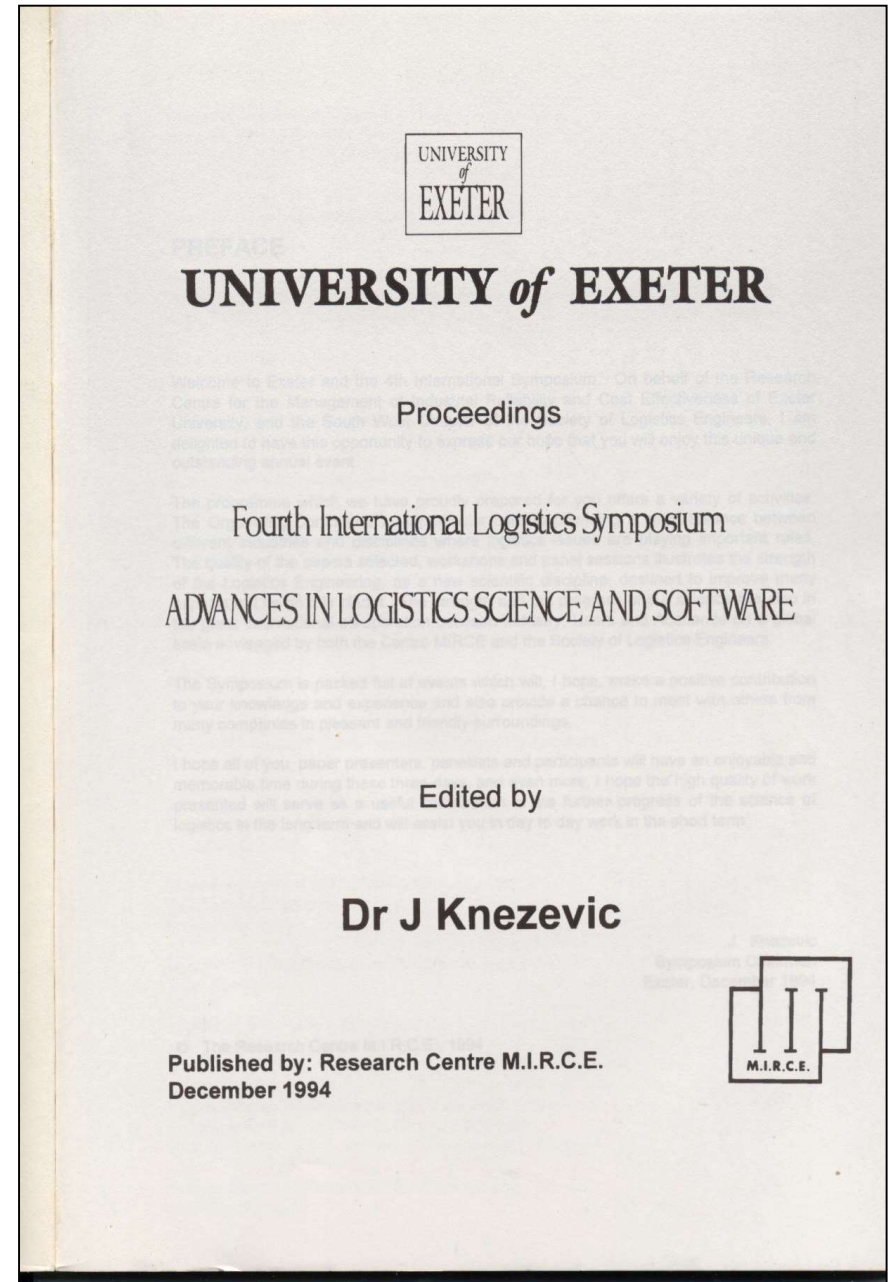
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MIRCE Symposium donation to Devon Air ambulance



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Expanded Warranty as a Tool for Improving
Equipment Reliability and Reducing Life Cycle Costs
Keith Frisby

Steve Leary

Welcome to Exeter and the 4th International Symposium. On behalf of the Research Centre for the Management of Industrial Reliability and Cost Effectiveness of Exeter University, and the South West Chapter of the Society of Logistics Engineers, I am delighted to have this opportunity to express our hope that you will enjoy this unique and outstanding annual event.

The programme which we have proudly prepared for you offers a variety of activities. The Organising Committee took particular care in providing a good balance between different industries and disciplines where logistics issues are playing important roles. The quality of the papers selected, workshops and panel sessions illustrates the strength of the Logistics Engineering, as a new scientific discipline, destined to improve many aspects of Life on this planet. The strength and the progress of our science lies also in the great international co-operation between Industry, Users and Academia on a global scale envisaged by both the Centre MIRCE and the Society of Logistics Engineers.

The Symposium is packed full of events which will, I hope, make a positive contribution to your knowledge and experience and also provide a chance to meet with others from many companies in pleasant and friendly surroundings.

I hope all of you, paper presenters, panellists and participants will have an enjoyable and memorable time during these three days, and even more, I hope the high quality of work presented will serve as a useful contribution to the further progress of the science of logistics in the long term and will assist you in day to day work in the short term.

Dr. Leszek Smith

The Measurement of Reliability of in-Service
Equipment to the British Army
Major Peter Drilon

Ground Support Equipment GRAM Philosophy
Peter Palmer


LRAR for In-Service (NOT LSAR)

John Taylor

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J. Knezevic
Symposium Chairman
Exeter, December 1994

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Managing Transition from Technology Readiness to System Fielding

H. L. Manuel

US Department of Defense -- Ballistic Missile Defense Organization

J. W. Cummings, Jr.

Dynamics Research Corporation, Arlington, VA

D. A. Grover

Washington Square Associates, Falls Church, VA

Abstract

The US. Military system acquisition process has changed dramatically in recent years. In the new acquisition environment, the Clinton Administration has placed great emphasis on technology readiness programs as a means of coping with uncertain threats and decreased budgets. Major streamlining of the laws governing defense acquisition is also underway. Traditional ideas and approaches to assuring system supportability are no longer acceptable and new alternatives must be found.

The US. National Missile Defense Technology Readiness program is one of the first programs to be developed using the new acquisition approach. The Ballistic Missile Defense Organization (BMDO) has developed a tailored planning and management concept and tools designed to manage the transition from technology readiness to a logistically supportable

operational defensive system. BMDO is developing and maturing ballistic missile defense technology, while maintaining the option to deploy a limited operational Anti-Ballistic Missile defense capability. This paper provides the international logistics community with insight into management techniques being used by one of the first US programs developed in the new acquisition environment. It describes how BMDO's innovative logistics management maintains deployment readiness and assures operational suitability in a highly complex technology readiness program.

1.0 Introduction

The National Missile Defense (NMD) Technology Readiness (TR) program was established as a result of Secretary of Defense Aspin's "Bottom Up Review" of US defense programs in 1993. The TR program was established because of the lack of a defined threat requiring a full scale



6th International MIRCE Symposium

10th - 12th December 1996 - Exeter UK

PROCEEDINGS

Edited by

Dr J. Knezevic

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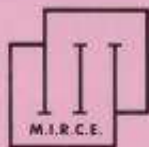
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MIRCE

*The Centre for Management of Industrial
Reliability, Cost & Effectiveness*

School of Engineering,
University of Exeter





7th International M.I.R.C.E. Symposium

**SYSTEM OPERATIONAL
EFFECTIVENESS**

8 - 10 December 1997



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The Centre for Management of
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University of Exeter, UK

Venue

The Greg Norman Suite

Woodbury Park Golf and Country Club
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8th International M.I.R.C.E Symposium

SYSTEM OPERATIONAL EFFECTIVENESS

7 - 9 December 1998



* Kathy Hegmann, Honorary Chairman, 7th International M.I.R.C.E Symposium

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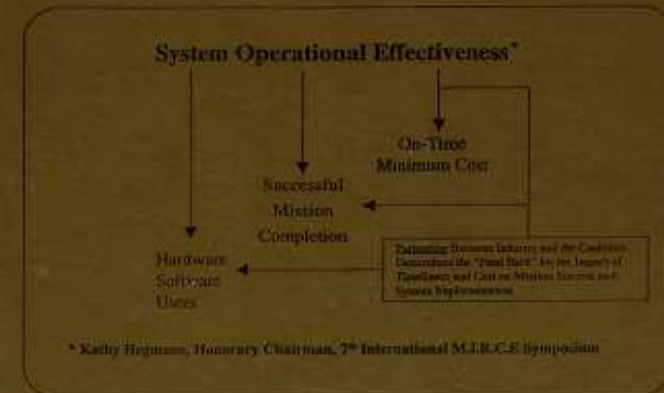
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8th International M.I.R.C.E Symposium

SYSTEM OPERATIONAL EFFECTIVENESS

7 - 9 December 1998



* Kathy Hegmann, Honorary Chairman, 7th International M.I.R.C.E Symposium

PROCEEDINGS

Edited by
Dr J Knezevic
Dr Dinesh Kumar
Mr C Nicholas

Exeter, UK



9th International Mirce Symposium

System Operational Effectiveness

1-3 December 1999

The Greg Norman Suite
Woodbury Park Golf and Country Club
Woodbury, Exeter UK

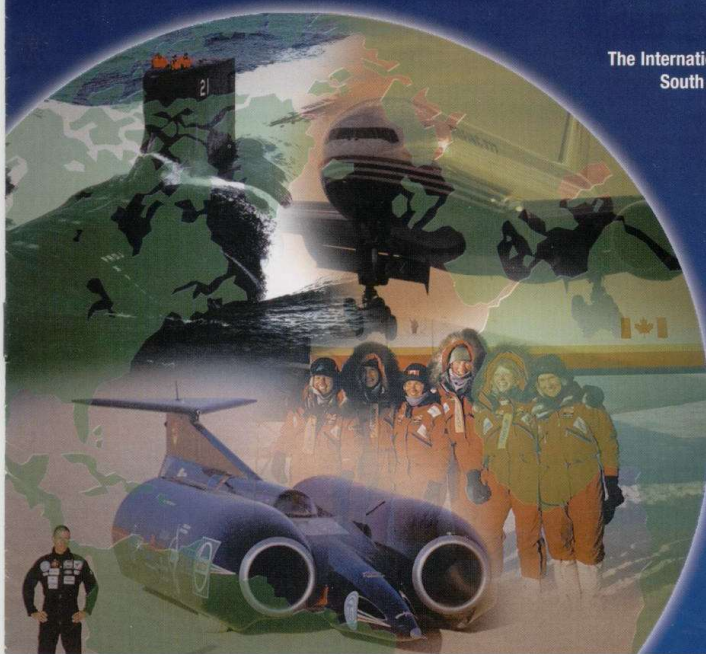


Mirce Academy
of
System Operational Sciences

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The International Society of Logistics
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PROCEEDINGS

9th International MIRCE Symposium

System Operational Effectiveness

1 – 3 December 1999

Editors:

Dr. J Knezevic
Dr. U Dinesh Kumar
Mr Clive Nicholas

Managing Editor:
Ms. Anne Verhamme

Welcome Address

Dear participants

On the threshold of the new millennium, it's my great pleasure to welcome you to this well-established International Event, on System Operational Effectiveness.

After 8 years of chairing this event on behalf of the Centre for the Management of Industrial Reliability, Cost and Effectiveness, M.I.R.C.E., of Exeter University, this year I am delighted to be in position to do the same job, but this time under the colors of a new and exciting organisation. That new organization is the Mirce Akademy, which was established in 1999 under my leadership, as an independent Institution for promoting System Operational Science through research, independent education and technical services.

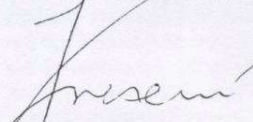
The Programme, proudly prepared by the Technical Committee, offers a variety of topics, which provide a good balance between different industries where multi-disciplinary facets of system operational effectiveness are plying important role.

The strength and the progress of our science lies also in the great international co-operation between, producers, users, researchers and educators on a global scale, as actively promoted by both organizations, The Mirce Akademy and SOLE: The International Society of Logistics.

I hope that you will find the Proceedings stimulating and beneficial to your existing knowledge and experience, and motivating for further improvements and innovations. I can not think of any better place for worldwide networking, than the pleasant and friendly staff and facilities of Woodbury Park.

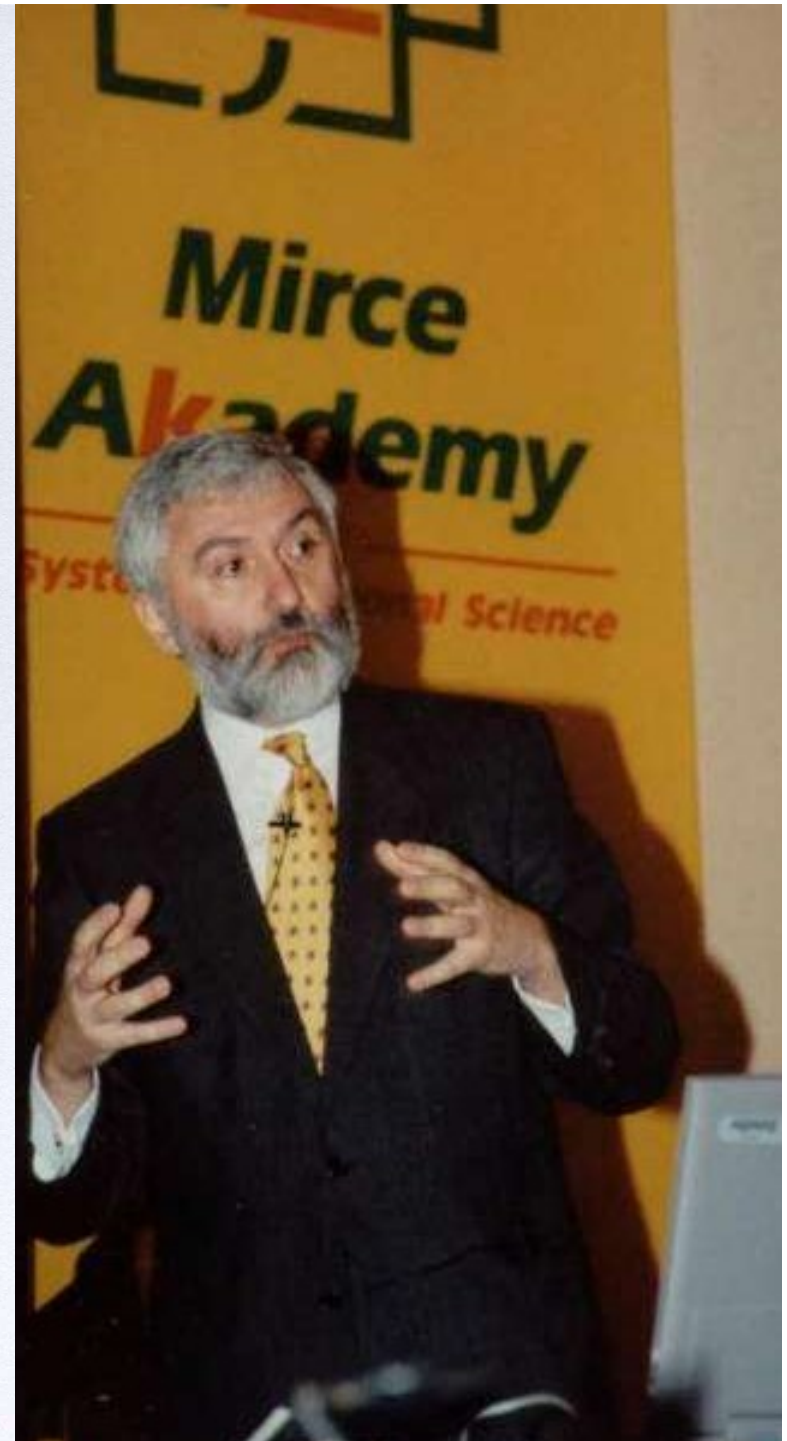
My sincere thanks go to our Honorary Chair Jack Hessburg; Chief Mechanic New Airplanes (retired) from the Boeing Company, Co-Chairs, Dr Dinesh Kumar and Dr Dinesh Verma and members of Technical Committee. Also, I wish to recognize a contribution to this Symposium made by members of SOLE, in particular Clive Nicholas who has been a great link between the Exeter SOLE Chapter of staff of the Mirce Akademy, which made this event possible.

All of us from the Mirce Akademy are looking forward to developing System Operational Science, with you, in next millennium, or two.



Dr. J. Knezevic
Symposium Chairman
Woodbury, December 1999.

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Operational Life Extension of Missile-based Systems through a Statistical Analysis Methodology

Luciano Pizziolo

NAMSA - NATO Maintenance and Supply Agency

Abstract

Significant political and economical changes have taken place during the last decade in the international scenario. On one side, new tasks have been assigned to the Armed Forces, like peace enforcing and peace keeping. On the other, there has been a generalised downsizing of forces and related budgets. This situation has generated for Defence planners the need to keep in service defence systems beyond their original design life. In case of systems using shelf/service life components, like missile-based systems, this poses a problem both of safety and of performance. The article proposes a statistical analysis methodology that utilises data from surveillance tests to assess shelf/service life projections. The economic viability of the proposed solution is also proved.

1. Introduction

The recent changes in the global strategic balance of forces, following the disintegration of the powerful Soviet Union and the dissolution of the Eastern Block alliance, generated in some Western World political and social forces the perception that Defence issues were now less pressing. Consequently, increasingly significant cuts were made in Defence budgets. Meanwhile, changes in the political scenario with the Middle East instabilities and the ethnic conflicts in the Balkans area, required of the military apparatus the capability to play new roles in addition to the standard one of defending the Country in the land, air or sea warfare, like peace-enforcement and peace-keeping missions.

The broadening of the scope of the mission assigned to Defence forces, together with the shrinking of related budgets, posed to Defence planners a very difficult problem to solve. In fact, new systems had to be acquired to enable the military forces to play the additional roles assigned, and new skills had to be developed in the military personnel, to fulfil the peace-keeping/peace-enforcement missions. Both required investments, the first in development of new technologies, the second in training. However, budgets were meanwhile shrinking to only a small fraction of what they had been only a few years before.

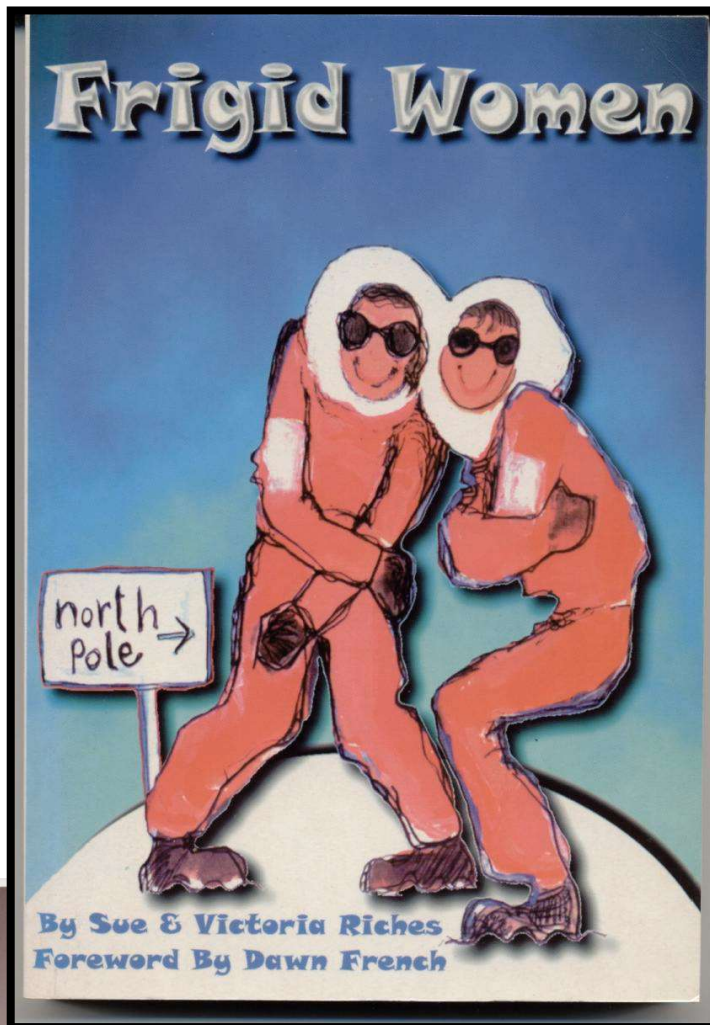
A solving approach to this difficult problem was put in place by Defence planners through careful tailoring of forces to expected threats, and by budgeting only for development of a few high-tech new systems, possibly in a multinational co-operation scenario to further reduce costs through economies of scale.

Meanwhile, efforts had to be made to keep existing systems in service beyond the original design operational life. This meant, amongst the others, removing all technological obstacles to extension of operational life, which is commonly accomplished through affordable modernisation programmes, given the budget constraints. Here, the logisticians play a major role in the assessment of alternatives for the selection of the options that guarantee achievement of the assigned operational goals at the lowest possible Cost of Ownership.

In the case of missile-based Defence systems, this approach also involves taking into consideration shelf/service-life items like rocket motors and the associated ignition devices.

In fact, postponing replacement of rocket motors, which would otherwise have reached the end of their design life, means very significant economies. However, this can only be accomplished





10th International MIRCE Symposium

System Operational Success

5-7 December 2000

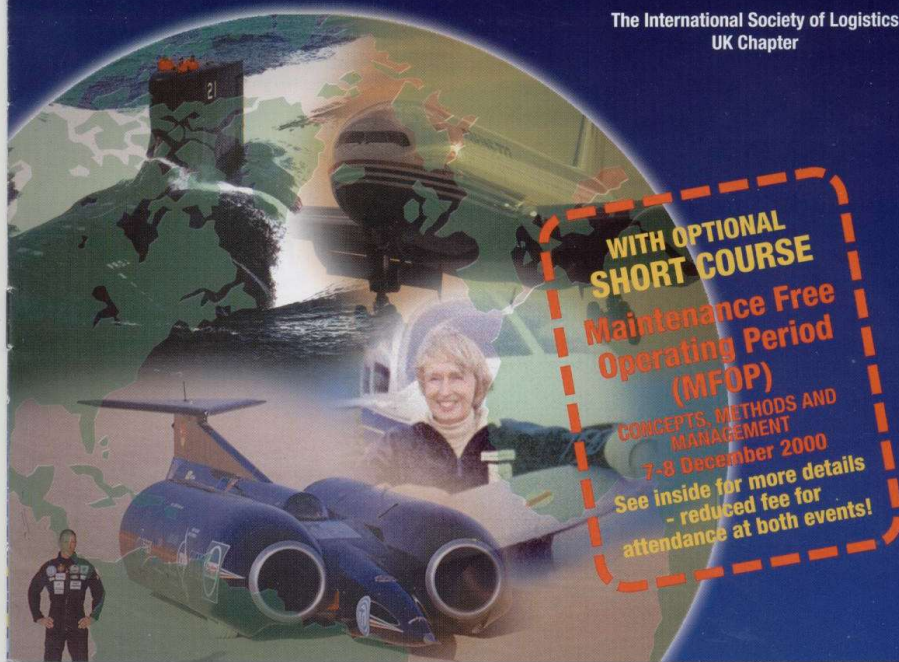
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CONCEPTS, METHODS AND
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7-8 December 2000
See inside for more details
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attendance at both events!

Assessment of Inspection Effectiveness

Richard Marshall Smith
Rolls-Royce Plc

Abstract

Throughout the life cycle of the more expensive or safety critical products, inspection is used to determine condition. This indicates whether the component or product is fit for purpose (or continued use). Determination of the effectiveness of the inspection regime is an important part of quality control. Tests are often carried out to qualify the regime as effective. Testing is expensive but is effective for mass production or where the variables that affect the outcome are known and limited. Automated inspection processes can often be used leading to high degrees of consistency.

When inspection is required on products in-service, there is a tendency towards greater variation in effectiveness. This is due to the large number of variables affecting the outcome. When inspection is carried out by personnel on in-service equipment, the probability for variation is at its greatest. For safety critical products, variation brings an increase in risk which may be unacceptable. This paper discusses, develops and offers a solution to the problem of determining the effectiveness of inspection.

1 Introduction

Some of the products developed and produced in the field of engineering are complex and can have the potential for catastrophic consequences if they fail. This damage can be self degrading but, more critically it can cause the loss of life and damage to property.

Because of the failure consequences encountered in this type of product, exhaustive efforts are made to ensure the probability of such events are understood, quantified and minimised. This involves a product development programme that brings a myriad of engineering disciplines into play in order to develop a product that meets the customers' technical requirements and the regulatory bodies' requirements for a safe system in a cost effective way.

At any stage in the life cycle from material through finished piece parts to in-service use, the Inspection task is used to ensure build to design, serviceability and sometimes safety.

The effectiveness of inspection must therefore be high for both life cycle cost implications and for safety considerations. The problem is how high should it be and how can it be measured and estimated.

Study of the literature on the subject of Inspection Effectiveness shows that very little work has been done in this field. There are many differing types of inspections and each brings its own particular problems. A method is required which allows the analyst

Assessment of Inspection Effectiveness

Richard Marshall Smith
Rolls-Royce Plc

Abstract

Throughout the life cycle of the more expensive or safety critical products, inspection is used to determine condition. This indicates whether the component or product is fit for purpose (or continued use). Determination of the effectiveness of the inspection regime is an important part of quality control. Tests are often carried out to qualify the regime as effective. Testing is expensive but is effective for mass production or where the variables that affect the outcome are known and limited. Automated inspection processes can often be used leading to high degrees of consistency.

When inspection is required on products in-service, there is a tendency towards greater variation in effectiveness. This is due to the large number of variables affecting the outcome. When inspection is carried out by personnel on in-service equipment, the probability for variation is at its greatest. For safety critical products, variation brings an increase in risk which may be unacceptable. This paper discusses, develops and offers a solution to the problem of determining the effectiveness of inspection.

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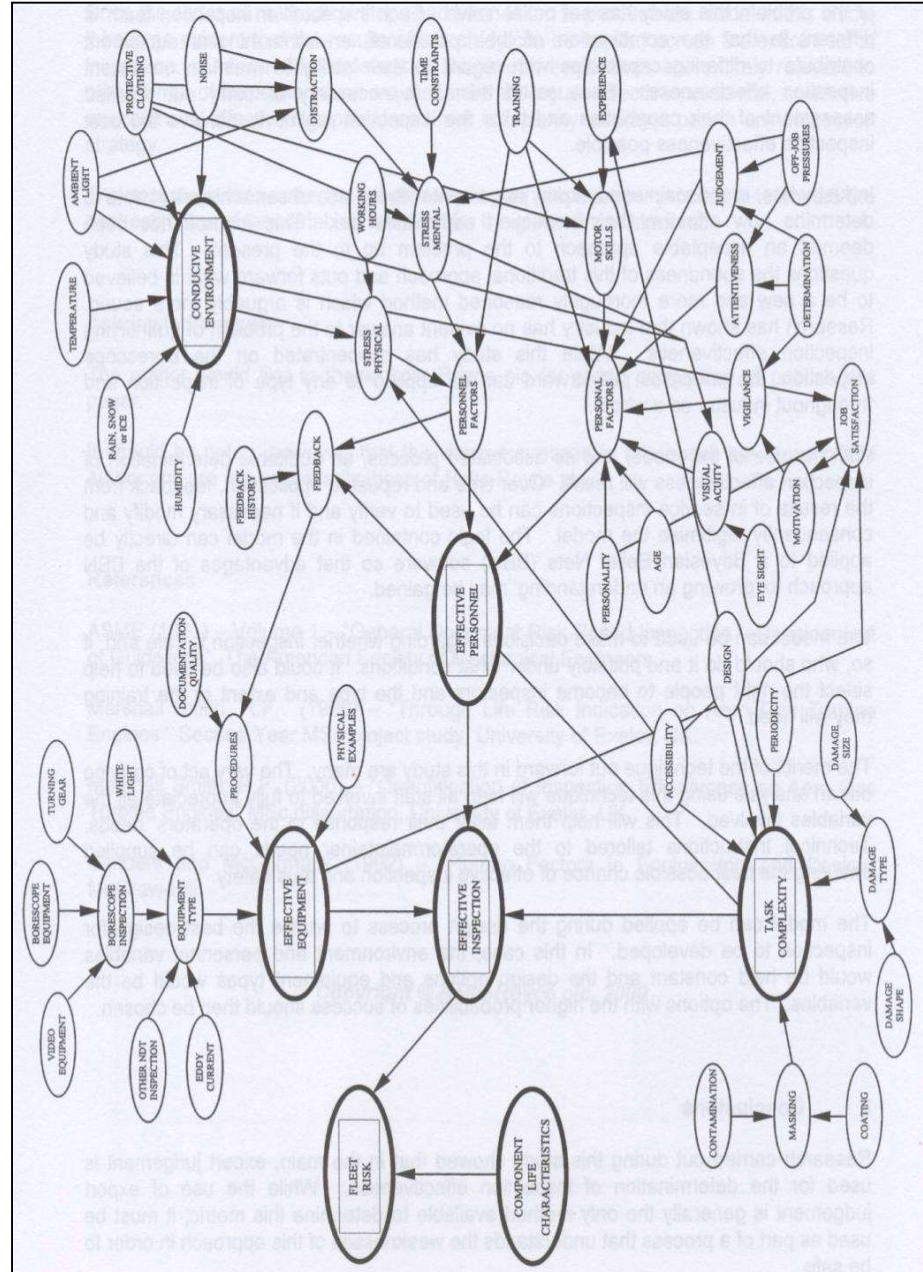


Figure 4.1 Effective Inspection Relationship Diagram – Directed Acyclic Graph

1st Grand Fellow - Nigel MANSELL OBE
4th December 2000

Nigel and Rosanne Mansell, Woodbury Park, Exeter, UK







December 2000

MFOP in Practice

John Crocker
Rolls-Royce plc

Abstract

In order to be able to quote a maintenance-free operating period, the manufacturer must have confidence in the product. It is not sufficient to be sure that all the necessary quality assurance procedures are in place, it is also necessary to have a good knowledge of how reliable the product will be over its whole life. This will mean not only understanding the physics of failure but, will also involve considerable pre-production testing or an extended initial period while component reliability can be monitored and established. In addition, strict controls will need to be enforced regarding the maintenance policy since it is likely that many perfectly healthy looking components will have to be replaced to reduce the risk of unplanned maintenance. Finally, it will require the operator to have a full understanding of the cost implications and a way of quantifying unavailability, in monetary terms. In this paper, we look at the areas of reliability demonstration and determining the best maintenance policy for a simple system with different cost drivers.

1. Introduction

Most of the papers on Maintenance Free Operating Periods (MFOP) have talked about manufacturers guaranteeing that a system or sub-system will survive a given period (e.g. 30 days or 150 [flying] hours) at a given probability of survival (e.g. 95 or 98%). This is in recognition of the fact that it is impossible to make anything that will never fail if operated for long enough and that, in most cases, these failures are to a greater or lesser extent unpredictable.

In this paper, we will start by looking at how, knowing the type and shape of the time-to-failure (TTF) distribution for a given item, we can determine the characteristic life needed to give the desired probability of survival (PoS) for a stated length of MFOP. Having established this value, we then look at how we determine, with varying levels of confidence, the actual characteristic life. Once we have derived the TTF distribution, we will then look at a simple system consisting a number of these items and look at the effects of three prime cost drivers on selecting the "best" maintenance policy.

The item chosen is a very idealised sparkplug being operated in a 4-cylinder car engine. For the purposes of comparing the effects of the three cost drivers, the system chosen is a fleet of 1000 of these cars which will be operated for a limited mileage and then decommissioned. The three cost drivers chosen are parts, labour and (vehicle) recovery.

The MIRCE Akademy



The 11th MIRCE International Symposium

in conjunction with

- SOLE - The International Society of Logistics
- PARC - Product Assurance and Reliability Centre
- DBM - Distribution Business and Management Association

4-6 December 2001

Woodbury Park, Exeter, UK

Data, Information and Knowledge Management

Tel: +44 (0) 1395 233856 Fax: +44 (0) 1395 233899 E-mail: mirce@mirce.com Website: www.mirce.com



“Should wind turbines be prepared for winter or left to their own devices?”

Dr John Crocker, Science Fellow, MIRCE Akademy, UK

Deep sea wind farms in very high latitudes face a “winter” that typically lasts for around 6 months during which time the seas around them are likely to be frozen making them inaccessible during this period. At other times, they may also not be particularly easy to reach due to bad weather conditions ranging from thick fog to gale-force winds making approaching these remote farms very hazardous. If a wind turbine fails during the winter, it will therefore be unproductive until a support vessel can reach it which could be up to 6 months. However, support vessels will generally have limited capacity and there may also be restrictions on how long crews of mechanics can stay at sea (or inside a wind turbine) so it may not be possible to service every wind turbine within a farm at the end of a summer. The question this paper attempts to answer is what the optimum opportunistic/preventative maintenance policy is given limited resources and limited accessibility.

Grand Fellowship Award to Professor Ari Dubi
5th December 2001, Woodbury Park, Exeter, UK.





The 12th MIRCE International Symposium

System Operational Effectiveness

3-5 December 2002, Woodbury Park, Exeter, United Kingdom

DETROIT	SOUTHWEST	1409	3:45P	121	ON TIME
FT LAUDERDALE	SOUTHWEST	1269	4:05P	123	ON TIME
FT LAUDERDALE	SOUTHWEST	270	3:00P	123	CHECK IN
FT MYERS	COMAIR	5091	2:20P	606	CLOSED
DALLAS/FT WORTH	AMERICAN	1201	6:32A	17	ON TIME
HARTFORD	US AIRWAYS	2712	3:35P	52	ON TIME
HARTFORD	DELTA	2318	4:15P	84	ON TIME
HOUSTON	CONTINENTAL	1505	3:15P	6	ON TIME
INDIANAPOLIS	DELTA	2403	4:35P	86	ON TIME
MIRCE	SYMPOSIUM	3-5.12	2002	BOOKING NOW	
KANSAS CITY MO	SOUTHWEST	109	4:35P	122	ON TIME
LONDON HEATHROW	UNITED	910	2:19P	42	BOARDING
LOS ANGELES	DELTA	333	3:25P	73	ON TIME
LOS ANGELES	SOUTHWEST	143	3:40P	126	ON TIME
LOS ANGELES	UNITED	231	4:25P	40	ON TIME
LOUISVILLE	DELTA	2409	2:20P	84	ON TIME
MEMPHIS	NORTHWEST	961	2:40P	38	CHECK IN
MEXICO CITY	AMERICAN	2115	2:55P	13	ON TIME

The main objective of the Symposium is to provide an international platform for the exposure and exchange of advanced concepts, methods, tools, data and techniques among Engineers, Managers, Researchers, Academics, IPT leaders and all other decision makers whose professional responsibilities and expertise lie in creation and support of Operational Success of Systems within the following industries and services:

- aerospace
- defence
- power supply
- water distribution
- gas supply
- health service
- transport
- distribution
- motorsport
- marine
- automotive
- railway
- agriculture
- telecommunication
- building/construction

It is our great pleasure to invite you to join us at this annual International Event. Over a thousand participants, from all continents, have previously come to share the knowledge with keynote speakers, paper and course presenters, with software exhibitors, and above all with each other. All of us have always enjoyed the traditional MIRCE Christmas Dinner when emotions, friendship, fellows, students, partners and celebrities mix with the traditional Christmas food and a drop(s) of red wine.

We hope that you will find the Programme stimulating and that you will be in a position to attend this event and give us the opportunity to serve you with the same level of professionalism and motivation as we have done in the past.

Master Class

System Engineering Trade-Off

Jack Hessburg

Chief Mechanic New Airplanes (RTD)

The Boeing Company





13th International MIRCE Symposium

System Supportability

A 21st Century Business Winner

2 – 4 December 2003, Woodbury Park, Exeter, United Kingdom

Including a

Master Class

in

System Engineering Science

presented by

Professor Arie Dubi

Professor of Engineering, Ben-Gurion
University of Negev, and
Grand Fellow of the MIRCE Akademy

based on his new monograph published by the
MIRCE Akademy and to be launched at the
Symposium

- ✓ System Engineer
- ✓ Supportability Engineer
- ✓ Supportability Manager
- ✓ Integrated Logistic Support Engineer
- ✓ Integrated Logistic Support Manager
- ✓ Specialist In –
 - Maintainability
 - Maintenance Economics
 - Maintenance Programming
 - Reliability
 - Support Equipment
 - Logistics Support Analysis
 - Initial Provisioning
 - Spares Forecasting
 - Cost Analysis
 - Training
 - Human Factors
- ✓ Customer Support Manager
- ✓ Availability Manager
- ✓ Maturity Manager
- ✓ Obsolescence Manager



MIRCE Akademy

System Operational Science









Mirce
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14th International MIRCE Symposium

Effective System and Process Management

Methods, Equipment and Software

1 – 3 December 2004
Woodbury Park, Exeter
United Kingdom

*Featuring Workshops by
Leading Practitioners*

System Through Life Cost Management

presented by

Ian Bennett

Director, Tribal Government Consulting

Managing the Integrated Logistic Support (ILS) Process

presented by

Barry de Beer

Mirce Akademy

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Mark Willis – Senior Business Manager (Energy)

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15th International MIRCE Symposium

Methods for Accurate Cost Prediction for Contractor Logistic Support (CLS)

30 November – 2 December 2005
Woodbury Park, Exeter
United Kingdom

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led by **Dr Jezdimir Knezevic**

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*Are you ready for
action?*

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provide an integrated
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predicting CLS Cost.

Using science-based methods
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from engineering
relationships
- analyse predictions for CLS
cost reduction
- evaluate CLS cost
predictions for decision-
making
- manage CLS cost

***New Format
Symposium***

**Grand Fellowship Award to Professor Michael Pecht
December 2005, Woodbury Park, Exeter, UK.**





Advances in Techniques, Tools and Technologies

16th International MIRCE Symposium

Managing In-Service Reliability, Cost and Effectiveness

Woodbury Park
Exeter
United Kingdom
6 – 8 December 2006

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sixteenth year is dedicated
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- *System Design,*
- *Component Design*
- *Durability,*
- *Maintainability,*
- *Supportability,*
- *Reliability,*
- *Operability,*
- *Availability,*
- *Costing and Economics,*
- *Maintenance,*
- *Logistic Support,*
- *Customer Support,*
- *Software,*
- *Human Factors,*

*and other specialist functions
that are critical for Managing
In-Service, Reliability, Cost
and Effectiveness.*



7th December 2006, Woodbury Park, Exeter, UK

**Honorary Fellowship Award
to
Dr Milija Koldzic
(1950 – 2006)**

**For the development of the
Method for the Analytical
Calculation of the Time to Failure
Distribution Based on Multi-
Variable Accelerated
Experimental Testing**



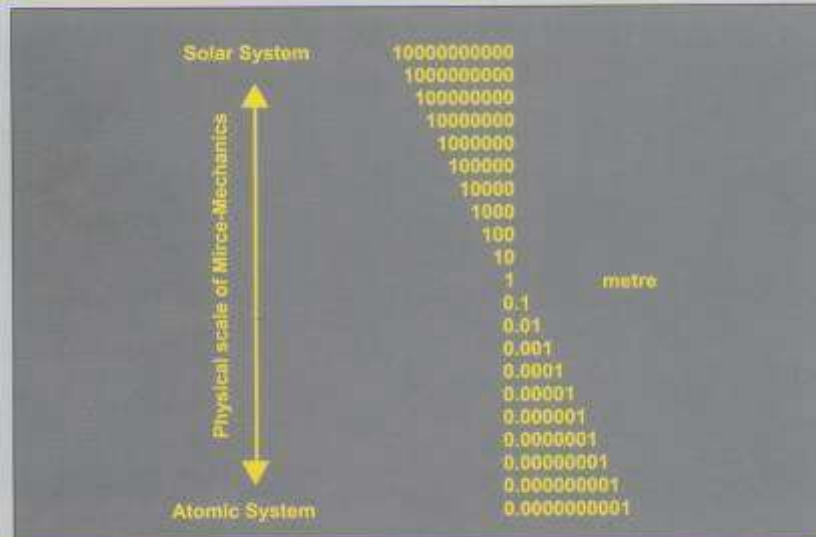
**Dr Milija Koldzic
1950 - 2006**



17th International MIRCE Symposium



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Be among the first to benefit from 25 years of continuous development that has resulted in the formulation of the Mirce-Mechanics, a science that will become the foundation for Mirce-Engineering (designing and managing the life of machines) in the same way as fluid mechanics, thermodynamics, quantum mechanics, hydro-mechanics and similar science-based disciplines are the foundation of mechanical, electrical, nuclear and other well recognised engineering domains.

Woodbury Park
Exeter
United Kingdom
6 – 7 December 2007

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18th International MIRCE Symposium

System Operational Effectiveness

*Achieving
Performance
Targets At
Least Cost*

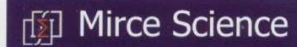


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Chief

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Evaluation & Support Management Section
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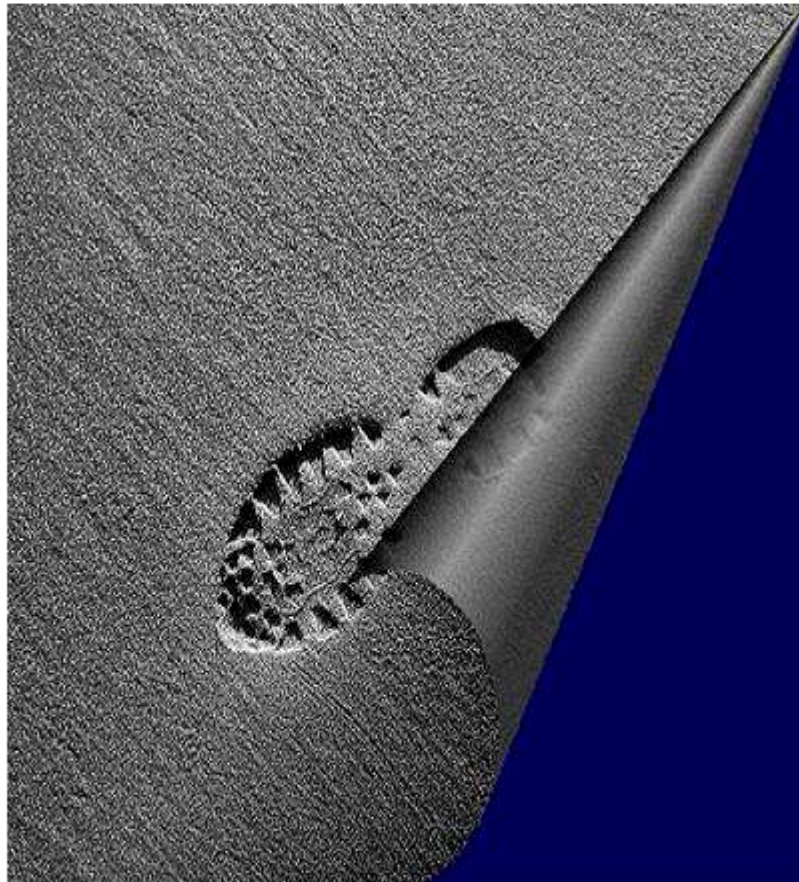
It all has to be maintained.

December 2008

19th International MIRCE Symposium

2 – 3 December 2009, Woodbury Park, Exeter, United Kingdom

Engineering & Managing Sustainability



- ***Reliability,***
- ***Maintainability,***
- ***Supportability***

Perspective



20th International MIRCE Symposium
7 – 9 December 2010, Woodbury Park, Exeter, UK

In-service Cost Reduction through Failure Management

- methods, procedures, software, tools and initiatives -

There is saying that main business of any business is staying in business. For that purpose business managers prepare business plans execution of which should keep them in business. However, failures of machines and human errors are the single biggest obstacle in delivering business plans. Consequently, the objective of this Symposium will be introduction of the science-based methods, tools and latest initiatives for the managing failure phenomena in the way that the reliability and safety of materialising business plans is maximised while reducing in-service costs.

Methods to be presented at this Symposium are expected to represent a unique approach where system operational process is considered as one single entity that integrates system structure, reliability of components, maintenance policies and strategies with corporate plans, revenues and costs. Fundamental body of knowledge for managing failure phenomena should be based on the proven laws of science that define the motion of in-service reliability, cost and effectiveness through system operational process resulting from natural causes and human actions.

Examples from aviation, defence, motorsport, nuclear and other industries are used to illustrate the methods and tools presented.

The Symposium could be very beneficial to design engineers, project managers, analysts, maintainer, planners and similar professions that are keeping business in business by making cost effective decisions based on the information available.



21st MIRCE International Symposium
5 – 7 December 2011, Woodbury Park, Exeter, UK

MIRCE Mechanics*

- *The Key for Effective In-service Support* -



MIRCE Academy



Public Sector Reality:

“Britain will be forced to temporarily mothball 40 out of 67 WAH-64 attack helicopters because training delays mean insufficient aircrew will be ready to operate the type. Mid-2004 will see at its peak 40 WAH-64 in storage following delivery. This is primarily because problems in development of the full mission simulator resulted in the start of main pilot conversion program being delayed from September 2001 to September 2003. Aircraft have already begun to be stored at the RAF site at Shawbury, and this will continue at least until 2006” (Aviation Week & Space Technology, 4.11.2002)

Business Sector Reality:

“Sipping a cold beer in the transit lounge of Kisumu Airport, Mr A.W.Sambu, a Nairobi businessman, said: “It appears that I shall be here for two weeks. Our Kenya Airways flight to Berlin could not take off because as we boarded her the plane developed a flat tyre. The ground staff tried to reinflate it with a bicycle pump – but all in vain. I think it is disgraceful that our national carrier planes should operate without spare tyres.”



Richard F.W. Bader Memorial Lecture

Professor Mark E. Eberhart

Molecular Theory Group, Department of Chemistry and Geochemistry, Colorado School of Mines, Golden, Colorado, USA

On this 28 day of May in the year 2012



22nd MIRCE International Symposium
5 – 7 December 2012, Woodbury Park, Exeter, UK

Applied Mirce Mechanics

- The Key for a Science-Based System Effectiveness -



MIRCE Akademy



“System Effectiveness is a quantitative measure of the ability of a system to deliver a target functionality performance through time. For example, how many days per year, the train operator is able to despatch its train from the platform at 6.23 am, when 1000 fare paying passengers expect to leave the station? Clearly, in the case of any delays the travelling public is not interested in whose problem it could be, designers, manufacturers, suppliers, operators, maintainers or somebody else’s. They are only interested in leaving at 6.23 am in order to arrive at a chosen destination at 7.30 am. The situation is exactly the same for the health, power, education, defence, food and all other providers, users and customers. Consequently, system effectiveness is the key factor of business competitiveness, as it is the main profit driver.” Dr Jezdimir Knezevic, President & Founder, The MIRCE Akademy



23rd MIRCE International Symposium
3 – 5 December 2013, Woodbury Park, Exeter, UK
Functionability Maintenance*

A Tribute to Jack Hessburg (1934-2013) - Grand Fellow of the MIRCE Akademy



Jack Hessburg was the first person in the history of aviation tasked to work with the design team to create a maintenance friendly aircraft. In that role he created his own job title – Chief Mechanic. He wrote his own job description – to design flying machines that will be loved by gate mechanics and in doing that, operators and the flying public would also be happy.

His talent, experience and passion for flying exceeded all expectations and today, 18 years later Boeing 777 is still loved by mechanics, as it is easy to fix, adored by the flying public as hardly ever a flight is cancelled and it is well respected by the competitors because of its high level of in-service reliability, safety and functionability.





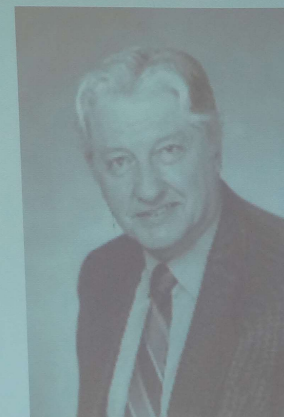
Junior Fellowship Award

I am pleased to certify that

Bryan Williams

was best placed to recognise his potential towards long term
success through his efforts of the MRCE Academy (across
educational, literary and professional endeavours)
for the promotion of the knowledge of Wrex Mechanics.

2017 2018 2019 2020



Richard W. Bader, * 15.10.1931; † 15.1.2012. Pioneer of Quantum Chemistry

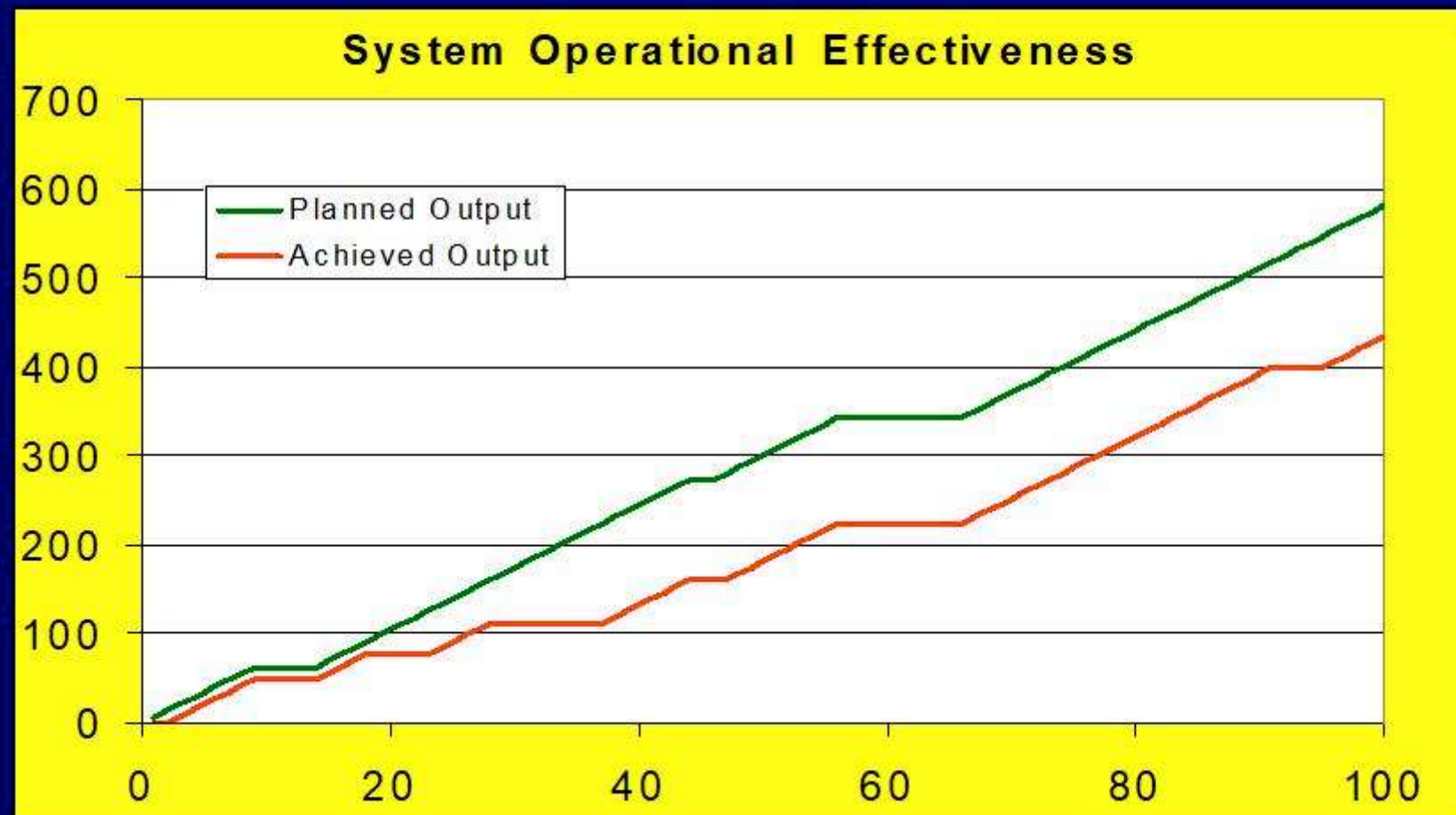


24th MIRCE International Symposium

2 – 4 December 2014, Woodbury Park, Exeter, UK

Maintaining Operational Effectiveness

- Mirce Mechanics Methods, Principles & Tools -*







Richard F.W. Bader GFMA - Memorial Lecture

Dr Mariusz Pavel Motoraj

University of Krakow, Poland

On this 3rd day of June in the year 2014

25th MIRCE International Symposium

8 – 9 December 2015, Woodbury Park, Exeter, UK

In-service Reliability

Prognostics and Troubleshooting as Mechanisms of Motion in Mirce Mechanics







Richard F.W. Bader Memorial Lecture

“I enjoyed your visit, very much”, Richard, 7th April 2010

Dr Jezdimir Knezevic, MIRCE Akademy, Exeter, UK.

On this 19 day of May in the year 2015

26th MIRCE International Symposium

13 – 15 December 2016, Woodbury Park, Exeter, UK

Science Based Functionability Management

“Science deprives many from the right to have an opinion.” A. Dubi

15th December-Workshop: Monte Carlo Method for Engineers & Managers

Maintainable System Functionability



Maintenance Tools for delivering Availability

Chris Hockley

Lecturer & Business Development

Cranfield University at the Defence Academy

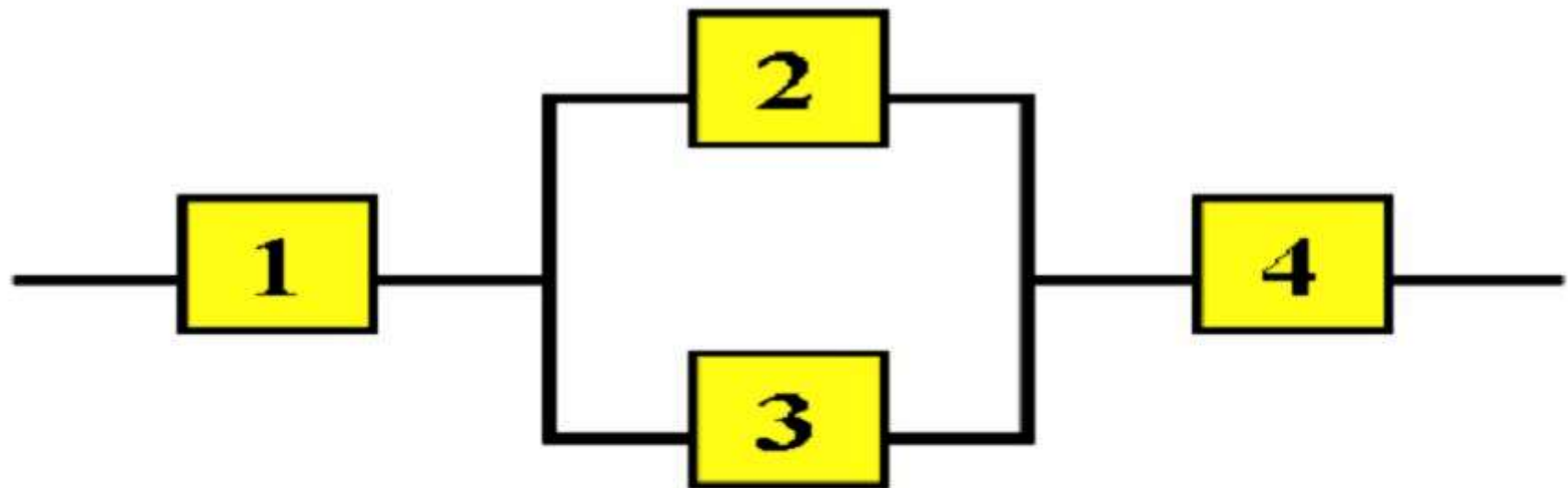
(Centre for Defence Acquisition)

& EPSRC Centre for Innovative Manufacturing in

Through-Life Engineering Services

at Cranfield Bedford

27th MIRCE International Symposium
12 – 14 December 2017, Woodbury Park, Exeter, UK
Reliability Beyond First Failure



$$R_s(t) = P(TTF_s > t) = R_1(t) \times [1 - (1 - R_2(t))(1 - R_3(t))] \times R_4(t)$$





Charlie Longue

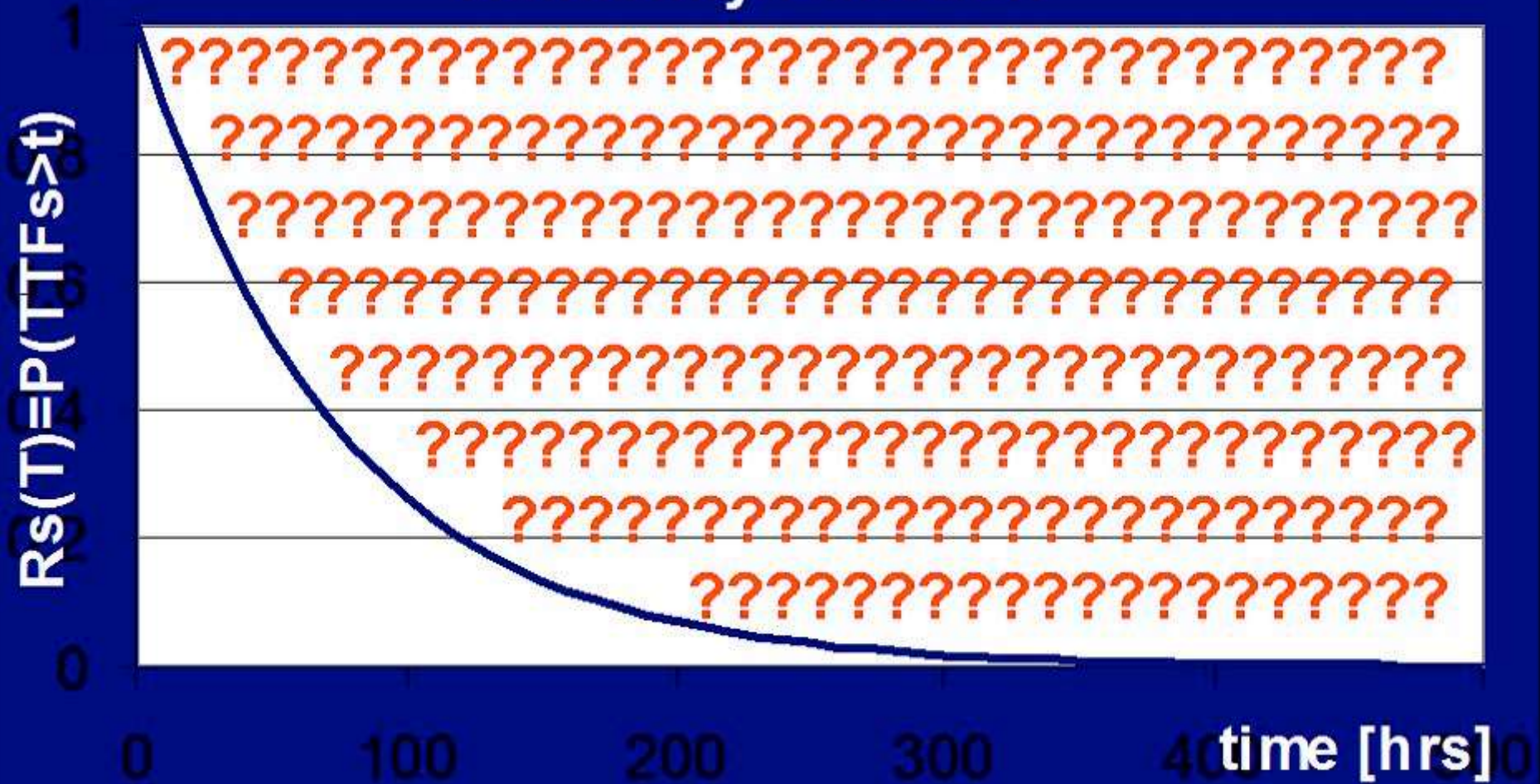
Coogan Lillian
M.E. Coogan, 1941-2018

28th MIRCE International Symposium

11 – 12 December 2018, Woodbury Park, Exeter, UK

What is Beyond Reliability Function?

Reliability Function

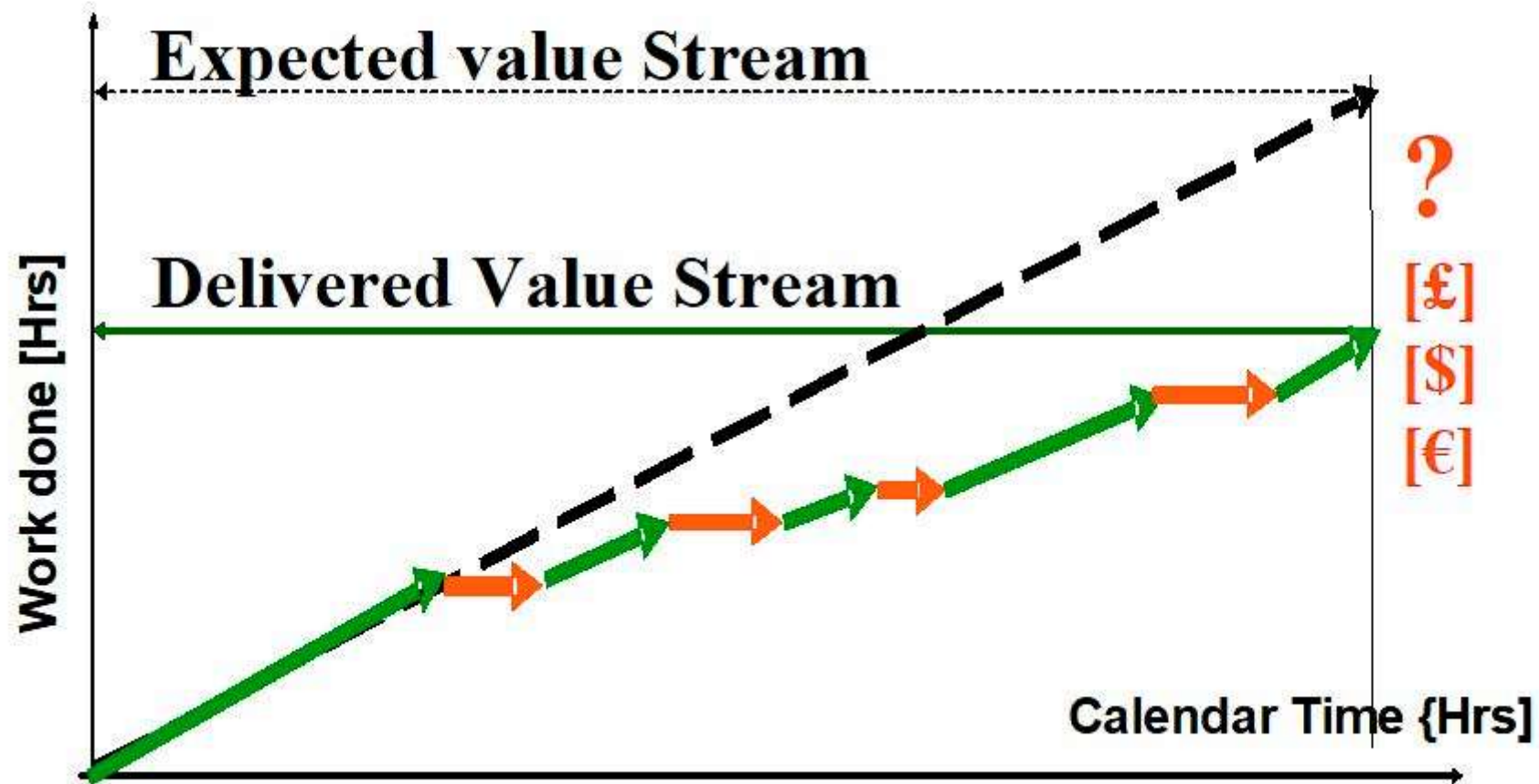




29th MIRCE International Symposium

3 December 2019, Woodbury Park, Exeter, UK

MIRCE Science: Maintaining Functionability Performance





30th MIRCE International Symposium

15 December 2020, **virtually from** Woodbury Park, Exeter, UK

Impact of COVID-19 on the Industrial Reliability, Cost and Effectiveness of Functionable Systems



- Free attendance
- Donations to:

World Health Organisation

**COVID-19
Solidarity
Response
Fund**

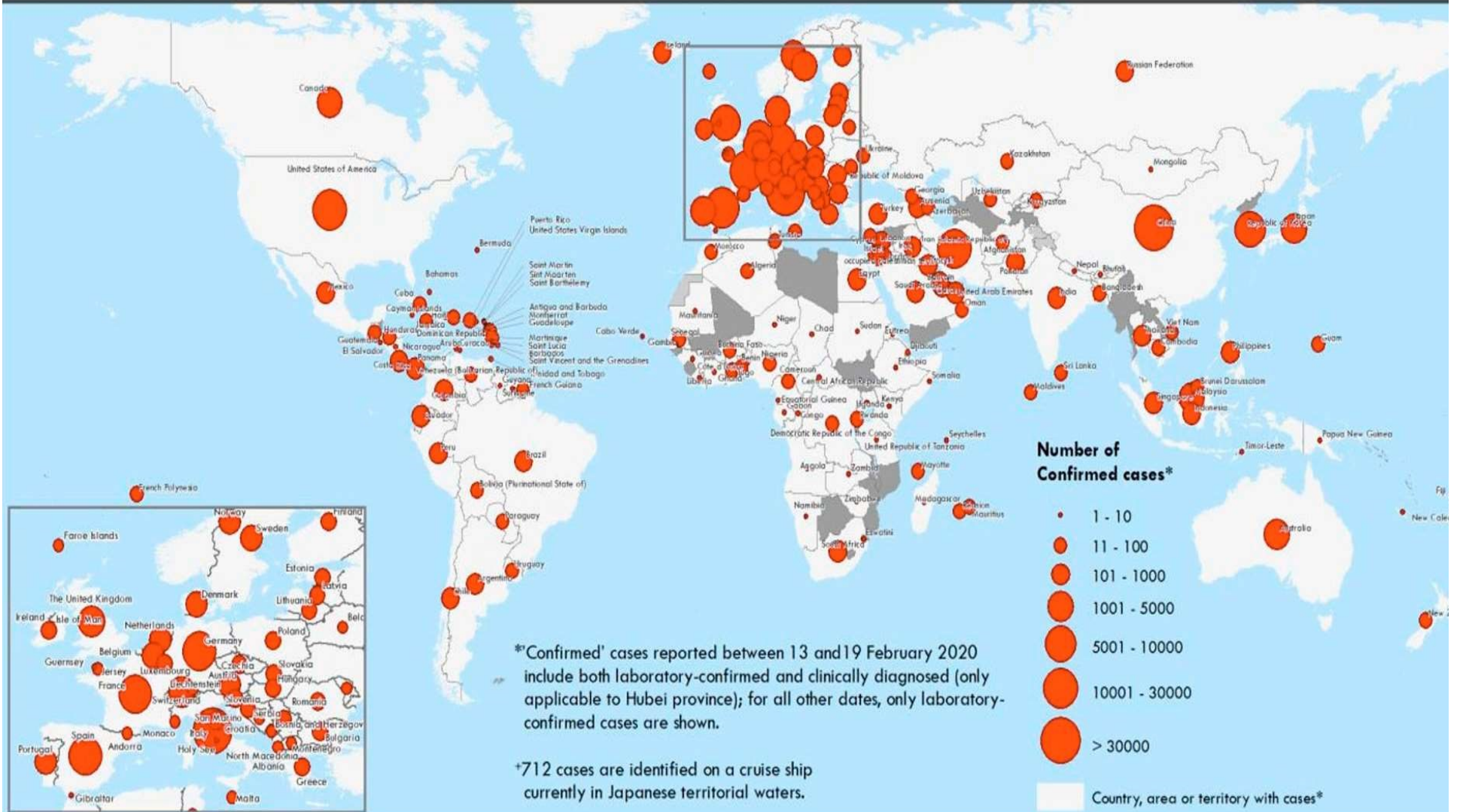


MIRCE Akademy wishes you Healthy & Happy 2021

<http://www.mirceakademy.com/uploads/MIRCE-International-Symposium-2020.pdf>



Distribution of COVID-19 cases as of 21 March 2020, 23:59 (CET)



Data Source: World Health Organization
Map Production: WHO Health Emergencies Programme

Not applicable

0 2,500 5,000 km
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The boundaries and names shown and the designations used on this map do not imply the expression of opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.



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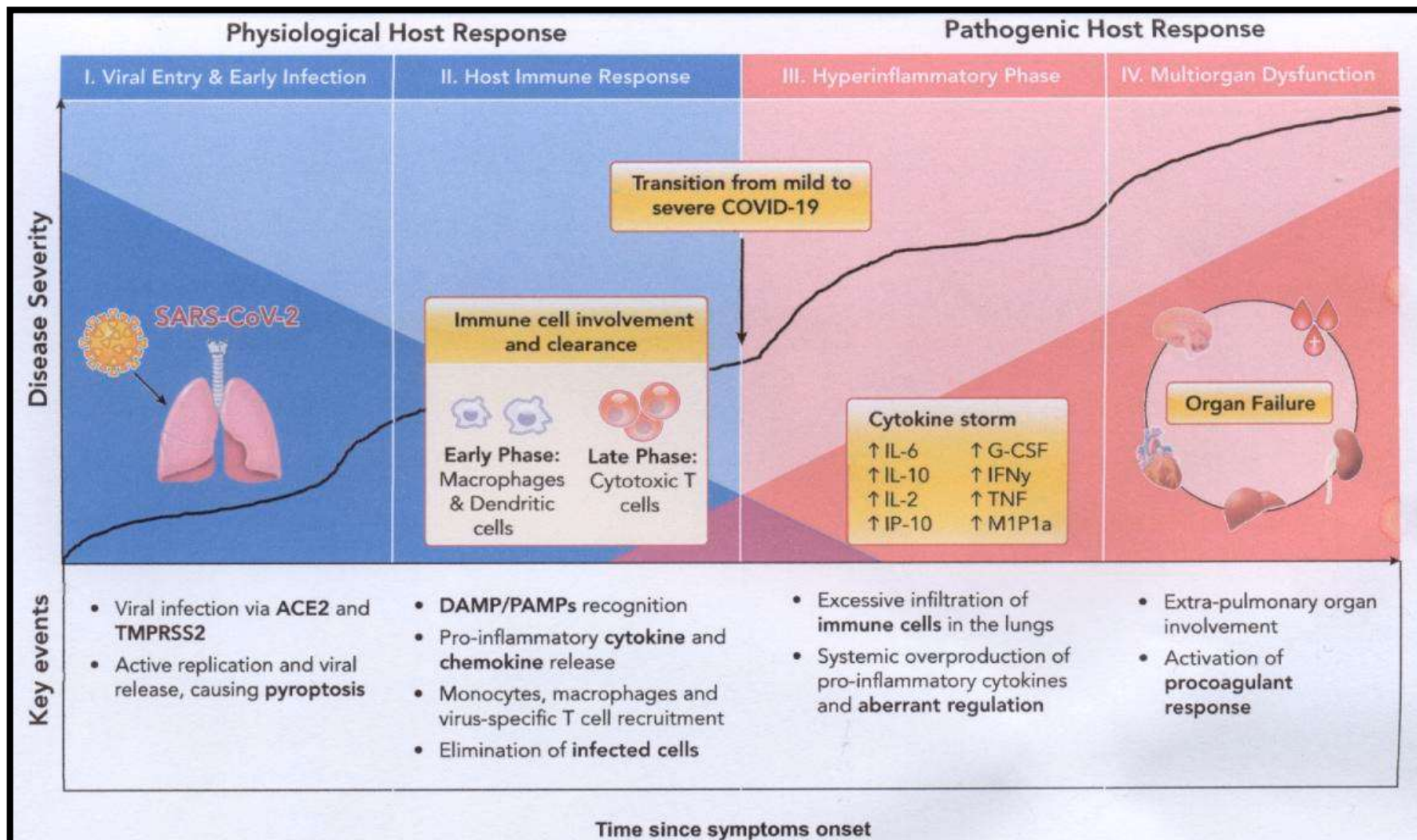


FIGURE 1. Characterization of key events in COVID-19 disease pathophysiological progression

The dark blue shading indicates physiological viral host response over time, and the dark red shading indicates pathogenic hyperinflammatory host response over time. Figure adapted from Ref. 124, with permission from the *Journal of Heart and Lung Transplantation*.