



# Asian Conference 2012



28 - 30 June | Singapore | Furama RiverFront Hotel

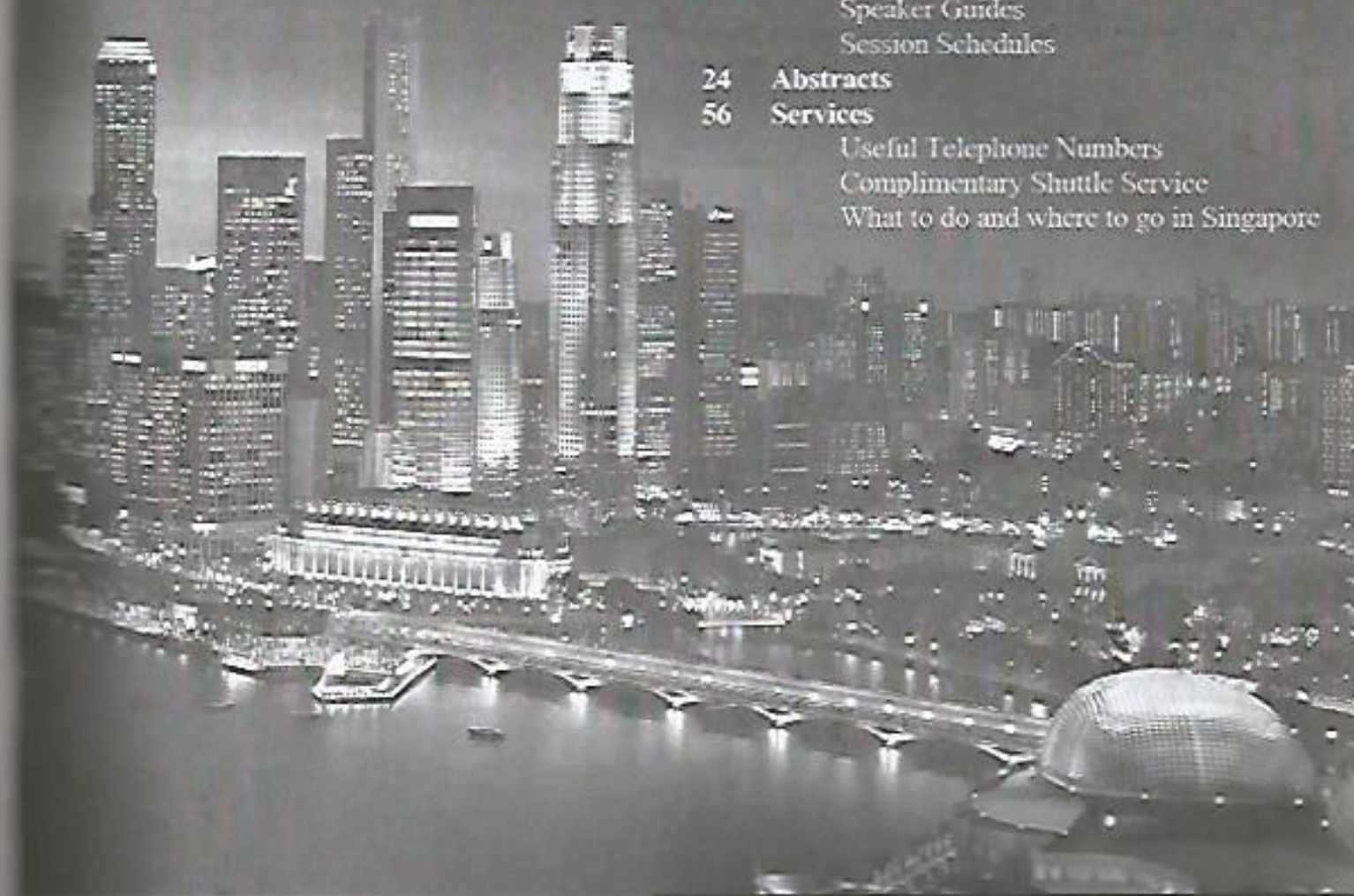
Organized by:  
Department of Industrial & Systems Engineering,  
National University of Singapore

Organizer & Sponsors:



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  - What to do and where to go in Singapore



## CONFERENCE VENUE

PERKASA RIVERFRONT Hotel, Singapore

1111 Beach Road,

Singapore 169633

Tel: (65) 6333 8898

Fax: (65) 6333 1588



# CONFERENCE OVERVIEW

Day 1) 28 June 2012, Thursday				
14:30 - 17:00	Marina Barrage Guided Tour - Furama Riverfront Hotel Lobby			
15:00 - 17:00	Workshop - "Publishing in top journals" - Jupiter III			
17:00 - 19:00	Registration and Reception - WaterFall Lounge, Level 1			
Day 2) 29 June 2012, Friday				
Venus II & III				
08:30 - 08:45	Registration			
08:45 - 09:00	Delegates and guests to be seated			
09:00 - 09:15	Opening Speeches			
09:15 - 10:00	Keynote I - "Data Fusion for In-Process Quality Improvement of Complex Systems" by Jianjun Shi			
10:00 - 10:45	Keynote II - "Flexibility in Engineering Design" by Richard de Neufville			
10:45 - 11:00	Coffee Break			
11:00 - 12:30	Venus II & III	Jupiter I	Jupiter II	Jupiter III
	IE in Taiwan	Human Factors I	Quality Control and Management I	Flexibility in Engineering
12:30 - 13:30	Lunch			
13:30 - 15:00	Venus II & III	Jupiter I	Jupiter II	Jupiter III
	IE in Hong Kong	Service Science, Management and Engineering	Quality control and Management II	Business Data and Analytics
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17:00 - 18:00	ANIE cum Asia IE Department Chair Meeting (By Invitation only) - Executive Board Room			
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	Decision Science and Technology	Supply Chain Management I	Manufacturing Systems and Project Management	Production Planning and Control I
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	Operations Research	Supply Chain Management II	Information Processing and Engineering	Production Planning and Control II
15:30 - 16:00	Coffee Break			
End of Conference				

Thu - 29 Jun, 0945 - 1030  
Room Venus II & III

## "Flexibility in Engineering Design"

**Richard de Neufville**

*Professor  
Engineering Systems and Civil and Environmental Engineering  
Massachusetts Institute of Technology  
United States*



### Abstract:

Flexibility in design is an idea whose time has come – back! While we rationally keep options open in planning our careers, the standard model of systems engineering has driven out this notion. Its textbook exposition starts with “Step 1: Define the requirements” as the prelude to optimizing to those specific criteria. The result is generally inappropriate, however, insofar as the “requirements” change, along with technology, markets, regulations and other definitions of need and opportunity.

We need to recognize uncertainty both in the definition of requirements and in the context of design, to create systems we can adapt to changing situations. We need to incorporate flexibility into the system design, to take advantage of new opportunities – and avoid downside pitfalls.

The analysis for flexible design requires us to investigate the performance of systems not just under an assumed condition, but for many, many different scenarios. As available stochastic programming and other optimization approaches cannot deal with either the computational size of systems designs in large numbers of scenarios, or with the system jumps associated with the exercise of optional flexibility, we need to employ a layered approach to systems design.

We need procedures combining screening models, simulation and subsequently optimization. This talk describes the approach and applies it to major systems such as oil platforms and urban development. Such experience indicates that flexibility in design can lead to double digit percent improvements in expected value.

### About the Speaker:

Dr. de Neufville's work now focuses on inserting flexibility into the design of technological systems. Major projects show that the use of “real options”, enabling managers to react to unanticipated events, significantly increases overall system performance. His MIT Press book *Flexibility in Engineering Design* appeared in 2011.

He is known for innovations in engineering education. He was the Founding Chairman of the MIT Technology and Policy Program, and author of 6 major texts on systems analysis. His many prizes include the Sizer Award for the Most Significant Contribution to MIT Education. He is part of the MIT team developing the Singapore University of Technology and Design.

His extensive international connections include appointments from the Judge Business School at Cambridge, the Instituto Superior Técnico (Lisboa), and visiting appointments at Harvard; the University of California, Berkeley; University of Calgary; London Graduate School of Business; Oxford; Ecole Centrale and the Ecole Nationale des Ponts et Chaussées (Paris). He spent a sabbatical in Japan as a US-Japan Leadership Fellow.

He has doctoral degrees from MIT and the Delft University of Technology. In 1965 he served as a first White House Fellow for President Lyndon Johnson.

## SESSION SCHEDULES (29 Jun – Fri)

### Human Factors I

29/6/2012 11:00 – 12:30

Room: Jupiter I

Chairs: Brian Peacock

Abstract: see page 27, 28

#### Analysis of human spinal curvatures while bicycling on road

Yi-Lang Chen<sup>1</sup>, Yi-Nan Liu<sup>1</sup>

<sup>1</sup>Ming Chi University of Technology, Taiwan

#### An Ergonomics Study on Musculoskeletal Disorders and Hearing Loss of Telephone Customer Service Workers

Chien-Hsin Yang<sup>1</sup>, Tsung-Hsuan Tu<sup>2</sup>

<sup>1</sup>Overseas Chinese University, Taiwan

<sup>2</sup>Da-Yeh University, Taiwan

#### Rotation of muscle activities while cycling with different handle heights

Yi-Lang Chen<sup>1</sup>, Shu-An Yeh<sup>1</sup>

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#### Ergonomic Participatory Design and Evaluation New Rice Planter Tool as Revival of Agriculture's Indonesia

Yopika Mutia Sandra<sup>1</sup>, Agus Manoyur<sup>1</sup>, Amaria Dila Sari<sup>1</sup>, Catur Siwi Handayaniingtyas<sup>1</sup>

<sup>1</sup>Universitas Islam Indonesia, Indonesia

#### Perception Configuration in Knowledge Sharing

Izza Azadina<sup>1</sup>, Yuni Rizki Bangun<sup>1</sup>

<sup>1</sup>Institute Technology of Bandung, Indonesia

#### Relationship between Lower Muscles Activities and Dynamic Balance Force

Chien-Chih Wang<sup>1</sup>, Yi-Jen Tsai<sup>1</sup>

<sup>1</sup>Ming Chi University of Technology, Taiwan

### Service Science, Management and Engineering

29/6/2012 13:30 – 15:00

Room: Jupiter I

Chairs: Kay Chuan Tan, Artie Ng

Abstract: see page 29, 30

#### The Drivers of Effectiveness and Efficiency in Service Design

Zhou Qi<sup>1</sup> and Tan Kay Chuan<sup>1</sup>

<sup>1</sup>National University of Singapore, Singapore

#### Service Reliability Evaluation using Fuzzy Failure Mode Effects Analysis and Grey Theory

Hyung Sool Oh<sup>1</sup>, Seung Ki Moon<sup>2</sup>, Jose A. Ventura<sup>3</sup>

<sup>1</sup>Kangwon National University, South Korea

<sup>2</sup>Nanyang Technological University, Singapore

<sup>3</sup>The Pennsylvania State University, United States

#### A Servicing Strategy Involving Imperfect Repair for Products Sold with One-Dimensional Warranties

Mustofa<sup>1</sup>, A. Cakravastia<sup>1</sup>, D. Irianto<sup>1</sup> and B. P. Iskandar<sup>1</sup>

<sup>1</sup>Bandung Institute of Technology, Indonesia

#### Organizational slack resources and performance in a public health care service provider: an exploratory study

Artie W. Ng<sup>1</sup>

<sup>1</sup>The Hong Kong Polytechnic University, Hong Kong

#### A Novel Hybrid Approach for ICU Patient Mortality Prediction

Jili Chen<sup>1</sup>, Xi Zhang<sup>1</sup>, Xiaoyun Xu<sup>1</sup>

<sup>1</sup>Peking University, China

#### An Ambulance Location Model Incorporating Failure and Survival Probabilities

Zhou Yuan<sup>1</sup>, Huang Boray<sup>1</sup>, Hung Hui-Chih<sup>2</sup>

<sup>1</sup>National University of Singapore, Singapore

<sup>2</sup>National Chiao Tung University, Taiwan

Session	Service Science, Management and Engineering
Date	29/6/2012
Time	13:30 - 15:00
Room	Jupiter 1
Chairs	Kny Chuan Inn, Artie Ng

### The Drivers of Effectiveness and Efficiency in Service Design

Zhou Qi<sup>1</sup> and Tan Kay Chuan<sup>1</sup>

<sup>1</sup>National University of Singapore, Singapore

Service design, which transforms a conceptual service idea into a marketable service, is a key activity in the new service development process. The extant literature mainly discusses the "how" issues of service design. There is insufficient understanding of the "how effective and how efficient" issues of service design. This research develops an integrative framework to examine the effectiveness and efficiency of service design projects. First, we strengthened the service design common principles based on an examination of extant service design studies. Second, we suggested that the management of service design projects should consider knowledge management and application of tools and techniques in order to enhance the effectiveness and efficiency of such projects. This research specified and validated the measurement model for the proposed integrative framework. Through empirical evidences from 78 service design projects, this research found that customer orientation (CO), process orientation (PO) and resources orientation (RO) are the key antecedents of service design effectiveness (ET) and efficiency (EC). Their influences on service design effectiveness and efficiency are mediated by either knowledge management (KM) or the application of tools and techniques (TT). The resulting framework can be used to benchmark a firm's service design practices and help guide project managers in prioritizing resources.

### Service Reliability Evaluation using Fuzzy Failure Mode Effects Analysis and Grey Theory

Hyoung Sool Oh<sup>1</sup>, Seung Ki Moon<sup>2</sup>, Jose A. Ventura<sup>3</sup>

<sup>1</sup>Kangwon National University, South Korea

<sup>2</sup>Nanyang Technological University, Singapore

<sup>3</sup>The Pennsylvania State University, United States

Service and manufacturing companies' efforts are increasingly focused on utilizing services to satisfy customers' needs, offer differentiated products, and survive in today's competitive market environment. The value of services depends on service reliability that is identified by satisfaction derived from the relationship between customer needs and service providers. In this paper, we extend concepts from the failure modes and effects analysis of tangible systems to services. We use an event-based process model to facilitate service design and represent the relationships between functions and failures in a service. The objective of this research is to propose a method for evaluating service reliability based on service processes using fuzzy failure mode effects analysis (FMEA) and grey theory. We define the failure mode of service as interaction ways that can be failed in a service delivery process. The fuzzy set theory is used to characterize service reliability based on linguistic terms during FMEA. Grey theory is employed to determine the degree of relation and ranking among risk factors that are represented as potential failure causes. To demonstrate implementation of the proposed method, we use a case study involving a typical automotive service operation.

### A Servicing Strategy Involving Imperfect Repair for Products Sold with One-Dimensional Warranties

Mustofa<sup>1</sup>, A. Ckravastin<sup>1</sup>, D. Irianto<sup>1</sup> and B. P. Iskandar<sup>1</sup>

<sup>1</sup>Bandung Institute of Technology, Indonesia

The warranty period offered by a manufacturer tends to be longer ranging from 3 to 7 years. Offering a product with a longer warranty period increases the warranty cost and this needs an effort to reduce it. For a repairable product, servicing strategies which combine minimal repair and imperfect repair can reduce the warranty cost significantly. In these servicing strategies, the number of imperfect repairs is only one over the warranty period. For a longer warranty period, more imperfect repairs would be needed in order to reduce the number of failures over the warranty period. Varnosafaderani and Chukova [1] studied a servicing strategy which can carry out imperfect repairs more than one for products sold with two-dimensional warranties. In this strategy, imperfect repairs are restricted in the middle regions of warranty period. In this paper we study servicing strategy where imperfect repairs are unrestricted by middle regions (middle intervals for one-dimensional warranties) but dependent on the age of failure under warranty. A numerical example is given to illustrate the optimal solution and compare this strategy with the existing similar servicing strategy that has been studied previously.

### Organizational slack resources and performance in a public health care service provider: an exploratory study

Artie W. Ng<sup>1</sup>

<sup>1</sup>The Hong Kong Polytechnic University, Hong Kong

While prior studies have looked into the relationship between budgetary slack and short-termism in managers within the discipline of management control, this paper explores the dynamics of slack resources in relation to a performance measurement system in a "mega" health care service provider. It adopts an interdisciplinary approach integrating resource-based view and contemporary studies about performance delivery to explore the impact of slack resources on overall quality outcome from such a health care organization. Statistical analysis of resource utilization, productivity and quality of health care services delivered is produced to reveal evidence about the underlying dynamics of heterogeneous slack resources. The results suggest that the organization's cost containment culture with a strategic focus on productivity measures has augmented cost effectiveness; however, not all slack resources would enhance quality performance. It argues that optimal utilization of slack resources available could be pursued if such resources are directed under a performance measurement system that enables effective monitoring of quality services.

### A Novel Hybrid Approach for ICU Patient Mortality Prediction

Lili Chen<sup>1</sup>, Xi Zhang<sup>1</sup>, Xiaoyun Xu<sup>1</sup>

<sup>1</sup>Peking University, China

Due to the different health conditions of an increasing number of serious patients, the intensive care unit (ICU) of a hospital needs to correctly classify patients into different groups according to their conditions so that medical resources could be properly distributed. The seriousness of the illness can be classified based on the significant risk factors and its corresponding impacts on the patients' survival. How to quickly identify the outcome is a major task for classification. This paper proposed a novel hybrid approach for solving this problem. To precisely classify the patients, RELIEF-based method for feature selection (RELIEF-F) is adopted for eliminating irrelevant and redundant variables, and the ensemble method based on decision tree is introduced for classification and prediction. To evaluate the performance of the proposed method, a cohort of 200 consecutive ICU patient data was borrowed for approach validation. The result shows that the hybrid approach provides more satisfactory identification performance in terms of the test errors than ensemble method with full set of variables.

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