

Modern RISC-Societies  
Towards a New Paradigm for  
Societal Evolution

Edited by  
Lučka Kajfež-Bogataj | Karl H. Müller  
Ivan Svetlik | Niko Toš



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To Rogers J. Hollingsworth and to Ellen Jane Hollingsworth  
who enabled the formation of the RISC-Program and the  
publication of this book.

To Yvonne Lucas (1922–2009) and to  
Hermann Müller (1925–2010)  
who would have liked to see this book come true.

## Foreword

Working in an inter- and trans-disciplinary environment like in the RISC-program (Rare Incidents, Strong Consequences) at the University of Ljubljana requires a coordinated effort by a large number of persons across national boundaries and across different languages. In our case, this co-operation included several faculties at the University of Ljubljana, Ivan Svetlik as vice-rector and, subsequently, Lučka Kajfež-Bogataj from the University of Ljubljana as local coordinators and Karl H. Müller from the Wiener Institute for Social Science Documentation and Methodology (WISDOM) as external adviser. Financial support for the RISC-program was provided by the faculties of the University of Ljubljana and two Austrian ministries, namely the Federal Ministry of Science and Research and the Federal Ministry of Labour, Social Affairs and Consumer Protection (BMASK). Thus, thanks go to –

- Gertrud Hafner in Vienna who was confronted with the difficult tasks of transforming a very heterogeneous manuscript into a homogeneous format and into the new publishing program of the book series
- Ivi Kecman, Anna Polajnar and Manca Poglajen in Ljubljana who served as a vital interface between Ljubljana and Vienna
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- Werner Korn who acted as an unmoved prime mover behind this book-project and behind the entire series on “Complexity, Design, Society” which has reached already its fourteenth volume
- a remarkably good spirit of stable cooperation and friendship between the editors which has overcome many obstacles and barriers and which will continue to last well-beyond the publication of this book.

This book has been the outcome of trying something new and innovative in the field of inter- and transdisciplinary research on societal issues, past, present and

future. Like in most innovative attempts in this area, one should be reminded of three important features of innovation processes in general.

First, Michael Vance stresses the peculiar fact that innovation processes should not be seen as radical departures, but in an intimately close relationship with their old environments.

Innovation is the creation of the new or the re-arranging of the old in a new way.

Consequently, the new RISC-framework takes large quantities of building blocks from traditional research across the natural or social sciences areas but provides a re-arrangement or, alternatively, a recombinative and integrative design for these many diverse and isolated components.

Second, Sir Francis Bacon [1561–1626], in his “Essay on Innovations,” provides another important hint on innovation processes, namely the imperfect nature of the early stages of innovations which applies quite naturally to the emerging RISC-framework as well.

As the births of living creatures, at first, are ill-shapen: so are all innovations, which are the births of time.

With respect to the future path of RISC-research, Woody Allen gives a consolatory assessment even for the case of failed innovations.

If you're not failing every now and again, it's a sign you're not doing anything very innovative.

In this sense, the general new outlooks and perspectives on the evolution of RISC-societies, even in the case of their unsuccessful diffusion, remain an honest attempt to address urgent societal problems in a genuinely new way.

It should be emphasized that the present book in its final design fits very well into the overall context of the book series with its emphasis on complexity research or on new research designs, new methodologies or, as an essential element, new perspectives on the evolution of societies.

We sincerely hope that the results of this book enable researchers in the field to widen their current perspectives on societal evolution significantly and to open up new ways for an inter- and trans-disciplinary research of contemporary societies with exciting and innovative results.

Vienna, September 2010

Lučka Kajfež-Bogataj | Karl H. Müller |  
Ivan Svetlik | Niko Toš

## Abstracts

### **The RISC-Program: An Experiment in Trans-Disciplinary Knowledge Production at the University of Ljubljana**

*Karl H. Müller | Ivan Svetlik | Niko Toš*

Between 2007 and 2009, the University of Ljubljana initiated a trans-disciplinary research program on rare events with strong societal repercussions and effects, which has been labelled the RISC-program (Rare Incidents, Strong Consequences). In this process, the university established a small unit that sought to act as a catalyst for promoting trans-disciplinary research on rare events both inside and outside Ljubljana. Following an international workshop in May 2007, the RISC-unit organized a series of talks, lectures, workshops and research activities, which highlighted the current knowledge frontiers on rare events as well as the available policy recommendations and best practices in reducing hazards and disasters related to rare events. From its overall goals, these RISC-activities were intended as a model for a new type of trans-disciplinary knowledge production that draws together expertise in the social, physical, biological and technical sciences to address urgent societal problems. The present article summarizes both the advances and the shortcomings of these RISC-activities.

### **RISC-Processes and Societal Evolution: Towards a Common Framework**

*Karl H. Müller*

This introductory article will present an overview of RISC-processes (Rare Incidents, Strong Consequences) and their changing relations and role in the evolution of societies, past and present. The article will make three central claims. First, RISC-processes can be considered as the missing link for an evolutionary theory of contemporary societies. Second, RISC-processes, in conjunction with additional building blocks within the wider evolutionary framework, become necessary and sufficient for a new and comprehensive theory of societal evolution. In this article, a broad outline of this new theoretical perspective on societal evolution will be provided. Third, the current stage of societal RISC-development makes it imperative to reconsider the problem of sustainability. In the light of the preceding RISC-discussion it will be argued that sustainability needs at least three main dimensions which are strictly independent from each other. The first one comprises the widely discussed sustainability issues with respect

to globalization, namely the generalizability of today's advanced development levels to the entire globe, the second one deals with the transferability of natural resources (environment, raw materials, water, air, etc) to future generations and the third main dimension of sustainability, however, must be related to RISC-processes and to the emergence of robust ensembles, resilient linkage structures and flexible support networks which, despite the impossibility to control RISC-processes locally or globally, are able to withstand most of the disastrous impacts of these rare events in the long run.

### **A Discussion on Zipf's Law**

*Heinz von Foerster et al.*

This article originated at the Macy-Conferences which took place between 1946 and 1953 and which, in retrospect, can be considered as the most important incubator for the subsequent developments of cybernetics, systems theory, artificial intelligence or the cognitive sciences. This particular presentation was made by Heinz von Foerster [1911–2002], an Austrian born scientist who emigrated to the United States in 1948 and who became widely known through his Biological Computer Laboratory [1958–1976] at the University of Illinois. Von Foerster's discussion of Zipf's law took place during the 9<sup>th</sup> Macy Conference which was held in New York's Beekman Hotel on March 20 and March 21, 1952. Since Zipf's law is just another word for power-law distributions which are in the center of the RISC-program, it is rather obvious why this hitherto unpublished manuscript has been included.

The following group of persons was present at the meeting and participated briefly or extensively in the discussion on Zipf's Law: W. Ross Ashby (Psychiatry), Gregory Bateson (Anthropology), Julian Bigelow (Electrical Engineering), John Bowman (Sociology), Ralph W. Gerard (Neurophysiology), Heinrich Klüver (Psychology), Warren McCulloch (Neuropsychiatry), Margaret Mead (Anthropology), Walter Pitts (Mathematics), Henry Quastler (Medicine and Computer Engineering), Gerhard von Bonin (Neurophysiology), Jerome Wiesner (Computer Engineering) and John Z. Young (Neuroanatomy).

### **Bubbles Everywhere in Human Affairs**

*Monika Gisler | Didier Sornette*

We review the "social bubble" hypothesis, which holds that strong social interactions between enthusiastic supporters of new ventures weave a network of re-

enforcing feedbacks that lead to a widespread endorsement and extraordinary commitment by those involved in the projects, beyond what would be rationalized by a standard cost-benefit analysis in the presence of extraordinary uncertainties and risks. Starting with analyses of previous bubbles, in particular the famous “Tulip mania,” the social bubble hypothesis is illustrated by the example of the Apollo project. The social bubble hypothesis suggests novel mechanisms to catalyze long-term investments, innovations and risk-taking by the private sector, which otherwise would not be supported.

### **New Models for Generating Power Law Distributions**

*Günter Haag*

Power-law distribution, rank-size distribution, Zipf’s law, hierarchy as a systemic organization into levels, self organized criticality and fractal phenomena are different aspects which may belong to the same coin. New models for generating power law distributions are discussed in order to demonstrate the typical aspects and issues of different modeling points of view. Moreover, some aspects of micro and macro based modeling approaches are discussed and shown. The interpretation of the models and the outputs of the different approaches are open for discussion and further research projects.

### **RISC-Processes and Their Weak Societal Protection Networks**

*Karl H. Müller*

This article provides an overview on the special relations between RISC-processes and their societal control potentials, be it at the national or at the global level. At the outset, the intricate relations between RISC-processes, controls or governance and forecasting will be discussed in greater detail and the classical equivalence of explanation control and prediction will be effectively abolished. The second major point places special emphasis on the inherent control mechanisms in self-organizing RISC-processes and their necessary failures in critical periods and stages. Finally, the third part of the article points to inherent vulnerabilities of globalized RISC-societies which lie clearly beyond any societal control.

## **Zipf's Law in Labor Status Transitions: New Insights from Austrian Labor Market Data**

*Michael Schreiber*

Motivated by discussions about competitive strategies of Europe that expect member states to implement flexicurity for employers and employees we present recent findings of research into new methods, tools and procedures for RISC-processes in labor markets. We studied the transitions in the employment status in Austria for a period of six months in 2009 by analyzing monthly data according to three distinctions among target groups: age, gender and education. It turned out that frequencies of changes in employment status followed a power law during these six months. Moreover, the complexity of the status change networks was shown to be reducible by cut-off values that enable schematic classifications of the different groupings.

## **Self-Reflexive, Contagious, Attraction-Driven Networks (SCANs): Towards a New Transdisciplinary Framework for RISC-Modeling**

*Günter Haag | Karl H. Müller | Stuart A. Umpleby*

This article extends the discussion of the modeling of RISC-processes to new clusters or families of network models which, so far, have not made their way to the core of socio-economic theory and model-constructions. These new network groups can be characterized as self-reflexive and contagiously attractive, *i.e.*, as driven by internal learning and by external imitation processes where contagious attractions become an intrinsic property of the network relations themselves and not an exogenous factor that can influence or disturb network actors. Usually, these networks exhibit multi-level structures and are normally marked by high degrees of observer-dependencies. In the course of this article, a more general class of models will be introduced under the heading of self-reflexive, contagious, attraction-driven networks (SCANs) which can be used for a wide variety of complex self-organizing RISC-processes across nature or society.

## **The Organizing of Promises: Finance Capital as Tensegrity System**

*Adrian Lucas*

By pandering to promises of controllability, traditional analyses of financial crisis fail, and they fail to the extent that blame is attributed to subjective

categories, irrespective whether the subjective scapegoats be the capitalists of Marxist analysis, or investment bankers self-rewarded for arbitraging regulatory frameworks, or over-enthusiastic credit borrowers, or whatever.

This paper instead takes its cue from Le Corbusier's desubjectifying, hence objective, reconfiguration of architecture, and applies Fuller's *tensegrity* concept to configure a more objective, since desubjectivized, analysis of financial capital as an organization of promises, whose immanent topology is that of a self-dynamic tensegrity system.

### **The Poverty of Economic Explanations**

*Peter Štrukelj*

The aim of this article is to provide a thorough analysis of the current style of economic explanations for the severe global financial crisis from 2007 onwards. Until now, economists were believed to be capable of ex post explanations and, due to the complex nature of the economic system, unable to produce accurate forecasts, despite Karl R. Popper's emphasis on the symmetry of explanation and forecasting schemes.

This article tries to establish that economists, by and large, are incapable of generating reliable and robust ex post explanations. Phrased differently, although these accounts look prima facie explanatory and although their proponents believe that they have accomplished an economic explanation, these economic ex post explanation schemes should not even be considered as explanation sketches, let alone as explanations. Rather, these explanatory accounts are an expression of the nearly perfect blindness of an entire profession vis à vis the evolution of our global economic and financial system.

### **Weather- and Climate-Related Natural Hazards**

*Jože Rakovec*

Global statistics on weather-related natural disasters show that, of all natural hazards leading to disasters, 90% are linked with meteorological or hydro-meteorological extremes or conditions, and 75% of economic losses as well as 70% of lost lives are due to these events [Golnaraghi, 2008]. A system of forecasts and warnings became operational on the global scale last year, with one part including a system for Europe [Meteoalarm, 2008]. The global system was developed based on a pre-existing one for the Alpine region, which had resulted from a project within the

scope of Interreg IIIb 2003–05. Some Slovenian early weather warnings [ARSO, 2008a] and earthquake warnings [ARSO, 2008b] contribute to it.

An overview of the natural causes and development of these phenomena is given, accompanied by statistics for the whole world as well as for Slovenia. The concept of the early warning system is presented as it regards the global and regional levels.

As an example, the case of the strong precipitation, flash floods and landslides on September 18, 2007 in Slovenia is discussed from the meteorological point of view, showing the main components that caused its severity: the long-lasting advection of warm, humid air ahead of a cold front and stationery convection. The components needed to help with the forecasting of such events and with real-time monitoring are briefly examined.

## **The RISC Potential of Converging Technologies**

*Toni Pustovrh*

Ever since their earliest inception, science and technology have played an increasingly important role as catalysts of cultural and social change, affecting and shaping human societies and the lives of individuals. In the past two decades, the rapid pace of scientific and technological development has opened many new fields and begun experimental work on numerous applications that may radically alter existing social relationships and structures, as well as challenge contemporary moral and ethical boundaries.

The convergence of technologies, such as those arising from combinations and mutual stimulation among the rapidly growing domains of nanotechnology, biotechnology, information technology and cognitive science, is expected to yield insights and applications with the greatest transformative potential, while having a disruptive effect on existing technologies and on society as a whole [Roco and Bainbridge, 2003; Nordmann, 2004].

Of course it is also possible to claim that such a process in its essence does not represent anything new, since scientific and technological progress has always occurred by combining the findings, tools, methods and insights from a variety of different fields. But there are some aspects of converging technologies that could be seen as having deeply transformative features. Advances in converging nano-, bio-, info- and cognitive [NBIC] technologies potentially offer tools for the direct manipulation of the underlying biological mechanisms of the human mind and body, thus enabling the manipulation of the genome, the “blueprint” according to which each individual’s physiology develops. Manipulations of the brain, whether involving molecular interventions in the form of psychopharmacological agents or

the implantation of cybernetic devices, could allow alterations of various cognitive functions of the human mind. Depending on whether we subscribe to a linear or an accelerating view of scientific and technological progress, we could claim that the number of innovations and their sophistication, power to manipulate and scope of influence is also increasing.

The field of synthetic biology can serve as an illustrative example. Synthetic biology (drawing from nano-, bio- and information technology) is currently striving to redesign the constituent systems of naturally occurring microorganisms, so that these can be employed to perform other functions valuable to humans. The anticipated benefits and risks, though at this time necessarily still speculative, are great. Microorganisms that could be engineered to decompose currently non-biodegradable materials such as glass and plastics or break up dangerous chemicals would greatly contribute to recycling efforts as well as to the remediation of polluted areas. Other uses could involve the production of useful materials and medicine, energy generation and the enhancement of human biological systems [Chopra and Kamma, 2006]. The risks could involve unanticipated side effects of interactions with the natural environment or the human body, the development of negative economic or social trends, or the risks emerging from intentional use of such technologies as weapons created for military or terrorist purposes [Boutin, 2006]. The release of engineered pathogens could thus present a catastrophic or even existential risk [Bostrom, 2002].

Another example is the potential ability to engineer offspring with specific physical or cognitive traits, popularly called “designer babies.” While truly sophisticated genetic engineering is not yet available, pre-implantation genetic diagnosis already offers the possibility of screening embryos for various genetically-based diseases and selecting those without such disorders. Sex selection was one of the first non-health-related traits offered to prospective parents, while recently The Fertility Institutes announced they would soon be offering selection of complexion, eye and hair color, as well as other customizations as they are made available by scientific progress [TFI, 2009]. These and similar technologies have been praised by some [Savulescu, 2001] as providing deeply transformative benefits, and criticized by others [Fukuyama, 2002] as harboring the potential to destroy human nature and society.

The paper thus presents an overview of some fields and applications of converging NBIC technologies [Beckert *et al.*, 2008] that are expected to have the greatest transformative impacts on individuals and societies in the near future, and it explores some of their potential societal implications, encompassing both risks and benefits, as shown in the examples of synthetic biology and “designer babies.” A special emphasis will also be given to global catastrophic and existential risks [Bostrom *et al.*, 2008] potentially inherent in these technologies, as well as to the

potential ability of such technologies to mitigate or control the aforementioned catastrophic risks.

## **Risk, Crises and Control: Between Fear and Negligence**

*Marko Polič*

Risk and crisis, although relatively rare for individuals, are common phenomena in human life. Ulrich Beck has even introduced the concept of a risk society. While the number of studies devoted to risk and crisis is constantly increasing, as is the understanding of these phenomena, this knowledge is still compartmentalized between different sciences, and the gap between the views of experts and those of the lay public is decreasing very slowly, if at all. Quite often, technocratic approaches prevail. Why are people sometimes afraid of matters that are not dangerous, while at the same time they ignore warnings about real dangers? Which risks are tolerable and which will provoke human actions? And what will these actions be?

Awareness of risk and crisis, as phenomena or events that threaten important human values and cause pressure and uncertainty, is necessary for beginning any action. Although actions depend on risk perception, they depend even more on subjective control, culture and social factors like trust or stigma. The mutual dependencies of these factors are discussed, especially the psychological aspects of risk and crisis management—that is, those matters that influence the decision-making and behavior of individuals and groups and depend on their psychological nature. A multidisciplinary and integrated approach will serve as the necessary context for proposing a satisfactory societal response in different emergencies in the sense of Simon's 'bounded rationality' model. Some psychological theories relevant for explaining people's behavior during disasters, which are seen as examples of crisis, are presented. These range from decision-making, bounded rationality, to the changes in the organizations.

## **Natural and Other Disasters: A Social Work Perspective**

*Romana Zidar | Mojca Urek | Vili Lamovšek | Nino Rode | Jelka Škerjanc*

The majority of models for responding to natural and other disasters aim at harm reduction before, during and after the event through the four-phase model of readiness, risk reduction, response and recovery. Such interventions overlook the importance of community resilience and their ability to cope with such events. Since social work is able to function in unforeseen and unpredictable

situations that demand innovative and original solutions [Flaker 2003], the role of the profession can contribute greatly to strengthening vulnerable individuals, groups and communities, when appropriately incorporated in the system of protection, rescue and relief.

Presented research entitled *The Analysis and Evaluation of Needs for Social Services in Cases of Natural and Other Disasters in the Municipality of Ljubljana*, conducted from 2007 to 2009, focuses on the vulnerability of individuals and groups, the accessibility of institutions and services in times of disaster, the implementation of rights for those affected by disasters, the service coordination, the voluntary initiatives, the non-discriminatory practices, and the sensitivity to the needs of the affected population. In this research we used the concept of sense-making methodology [Dervin *et al.*, 2003]. This methodology enables the individuals who survived disaster, irrespective of their role in it, to reflect on their real experiences; this allows the research to focus on the event itself instead of on the formal social structures and/or societal roles in which the individual operates, as is typically done. The methodology was applied through thirty micro-moment time-line interviews, organized with the model of simultaneous sense-making.

Results indicate that there are deficiencies in the existing formal, semi-formal and informal systems of protection, rescue and relief. Respondents identified as a gap the significant lack of community and social support. Through the research, the authors identified 10 categories of deficiencies: too great a response time, disconcerted performance of some organizations and inappropriate informing of people, lack of available staff or crucial person in some institutions, lack of clearly defined common protocols, lack of criteria for and opacity of relief distribution, imbalance of power and unequal distribution of resources and relief among the population, frequent discrimination and human rights violations, overlooking vulnerable (poor) groups of the population, inaccessibility of different forms of support in the field during and after the disaster, resorting to bureaucracy because of nonexistent protocols, lack of psychosocial support and relief for rescuers.

## **Secondary Disaster and Social Work**

*Jelka Škerjanc*

In July 2004, in the Upper Soča river valley, Slovenia, the third earthquake in the last 28 years affected the living conditions of the residents. Three main facts have previously defined the support after earthquakes in the Bovec area: the support for residents has not been sufficient; the support has been short-term and focused

mainly on the material living conditions of residents, and there has been almost no support for people struggling with their every-day living conditions.

Based on past experiences, the residents feared the reconstruction, claiming that for some of them, the reconstruction was itself another ordeal to be suffered. In a complex situation of extraordinary circumstances, the probabilities were high that the residents' needs would be overlooked and their expertise in their lives ignored. A three-month-long, social work volunteer camp project was set up to support residents in organizing their lives. Volunteer social workers took the side of the residents. From this perspective, the residents' situation became more visible, and some features that generate stress and concerns for the residents in reconstruction after a natural disaster were brought to light.

In the article, we address the roles and characteristics of social work performance in organizing support for residents after a natural disaster. The support was organized according to the individual resident's definition of his or her reality and the need for service provision. The tasks performed were recorded daily according to the methodology that allows further analysis about the following: the needs for citizens in organizing their lives after natural disaster; the roles of social workers in providing support; effects of stakeholders involved; the distribution of power between the citizen and structures involved in reconstruction. The statistical records of the services delivered by the project brought to light the experiences residents had with structures and institutions, political subjects, media, volunteers and charity organizations after being affected by a natural disaster. There emerged an accumulation of stress and trauma generators for residents who have little or no means of support for facing them, for reducing them or for actively coping with them. Every angle that we view the situation of the residents from shows us their loss of power in their lives and the little or no control over the solutions to improve it. At the moment when natural disaster hits citizen reality, along with the consequences that disaster creates, there emerge additional generators of trauma and distress.

The findings also lead to the conclusion that in organizing support for residents after a natural disaster, social work has an important role to play. Its place is with the residents and at their side. From this standpoint, social work acts to support residents, making sure their voices are heard and that they maintain control over the support they receive. Thus, social work has a unique perspective on the residents' situation and on their need for support. The information gathered from the resident's perspective enables the design of original, genuine and creative answers to his or her situation. Since the answers respond directly to people's needs, they are also efficient.

## **“Tsunami Project:” A Case of a Collaborative Project Between Two Universities**

*Mojca Urek | Bogdan Lešnik*

The paper is a report on the findings of a research camp held in a village on the southern coast of Sri Lanka eight months after the Indian Ocean tsunami. The camp was part of a wider project of collaboration between the University of Colombo and the University of Ljubljana, and its participants were students from both universities working together as a group. The report is mainly focused on the views and experiences of humanitarian aid as expressed by the people of this village. They keenly observed the distribution of aid and saw irregularities and abuses that only increased their distress. Among other issues, they questioned the methodology that caused less visible and socially excluded members of the community to be excluded once again from the distribution of aid, and they particularly resented being forced into submission. The project that started as a summer camp in this tsunami-affected village led to the signing of a Memorandum of Understanding between University of Colombo and University of Ljubljana for academic collaboration in the field of social work. This was followed by introducing social work as a stream within the special degree program in sociology at University of Colombo and by a fruitful exchange of knowledge, students and teachers between both universities.

## **Seismic Isolation for Asymmetric Building Structures**

*David Koren | Vojko Kilar*

The paper presents the summary of the main results of research work within the framework of the doctoral thesis of the first author performed in the past two years at the Faculty of Architecture, University of Ljubljana. The paper examines architectural-structural particularities of asymmetric buildings in earthquake-prone areas and the possibilities for the implementation of advanced technologies to increase earthquake resistance of such structures. In doing so, it examines new dimensions offered by the use of one such advanced technology (*i.e.*, various devices of seismic isolation such as bearings, dampers, systems for displacement reduction) and their influence on architectural building design in earthquake-prone areas. Conventional design of structures, which is based on ensuring sufficient stiffness, strength and ductility, does not completely prevent the structure from damage. Contrarily, seismic isolation as a modern alternative in earthquake-resistant design offers a possibility of much higher damage protection, yet with much bigger

financial input, which could be justified only for especially important buildings. In the first part of the paper, the architectural-urban reasons leading to the design of irregular buildings in architecture are determined, and explanations for its unfavorable seismic behavior from a structural point of view are given. Furthermore, the promising results of parametric study on the seismic behavior of structures with different levels of structural asymmetry isolated with lead rubber bearings are presented. The nonlinear dynamic analyses have been performed, and the results obtained have shown that the behavior of base-isolated structures is much affected by the distribution of isolators. It was observed that some distributions favored by common building codes are best only for accommodating the torsional effects in the base isolation system. A significantly different conclusion was found observing the nonlinear behavior of the superstructure, where such distributions might cause more damage in the flexible side of the structure.

In the second part of the paper, a simplified nonlinear method is applied for analysis of base-isolated structures. For this purpose, a new bilinear idealization of the capacity curve for a base-isolated structure is proposed. In this way, the new method is capable of detecting the first damage (yielding point) of the superstructure as well as of estimating the behavior of the superstructure further in the nonlinear range. The results are presented in terms of top and base displacements as well as damage patterns of the superstructure. Comparisons of the results of the simplified method with the 'exact' results of nonlinear dynamic analyses have shown a very good agreement. It has been shown that the presented simplified approach might be a valuable tool for design, analysis and verification of the behavior of seismically isolated structures.

It has been shown in the paper that the correct use of seismic isolation can contribute to freer design of architecture, which is in the interest of both structure and architecture designers. Moreover, the topic discussed is rather interdisciplinary and tries to improve the level of cooperation between architects and other experts. In doing so, it would also make it possible to shift certain interesting architectural concepts from earthquake-safe areas to earthquake-prone ones. In this way, more advanced, more daring and at the same time sufficiently earthquake-resistant architectural designs would be possible to build.

## **Socio-Economics and a New Scientific Paradigm**

*Rogers J. Hollingsworth | Karl H. Müller | Ellen J. Hollingsworth |  
David M. Gear*

This paper argues that a new scientific paradigm [Science II] is slowly emerging and is rivaling the Descartes-Newtonian paradigm [Science I], which has been dominant during the past several hundred years. The Science II paradigm places a great deal of emphasis on evolution, dynamism, randomness, chance, and/or pattern identification. As a cause and effect of the new paradigm, scholars in the physical, biological and social sciences are increasingly addressing common problems. Several of these are discussed. In their research, these scholars are using common models, methods, and metaphors. The paper focuses much of its attention on the field of socio-economics as an example of how the newly emerging paradigm [Science II] offers considerable potential for a hybrid field of social science to become more engaged with colleagues in the natural sciences. The convergence of interests across scientific fields has enormous implications for the appropriateness of reshaping the structure of existing universities that encourages high fragmentation, specialization and differentiation, but poor communication across academic disciplines.

## **Turning Science Transdisciplinary: Is it Possible for the New Concept of Cross-Disciplinary Cooperations to Enter Slovenian Science and Policy?**

*Franç Mali*

In the paper, some theoretical and empirical aspects of scientific trans-disciplinarity are presented. The development of recent post-academic science is characterized by a strong orientation to trans-disciplinarity in science. For example, the whole 'philosophy' underlying the European Research and Innovation Area places a strong emphasis on cross-, inter- and trans-disciplinarity in science. Discussed in more detail in the contribution, the concept of converging technologies represents a new phase in the development of trans-disciplinarity in science. In the paper, the main attention is given to the explanation of some barriers that hinder the realization of the new trans-disciplinarity in science and policy discourse in Slovenia. Here, the new role of the centers of excellence as new intermediary science organizations is highlighted. Namely, the centers of excellence could play an important role in shifting science and policy discourse from disciplinarity to trans-disciplinarity.

## **Approaches to Interdisciplinary Collaborative Research**

*Simona Tancig | Urban Kordeš*

The aim of this article is to identify some of the main issues related to inter- (trans-, cross-, multi) disciplinary work on complex problems. The focus is on concepts, theoretical frameworks, practical considerations and challenges, and possibilities of collaborative learning and problem solving.

# 1

## The RISC-Program: An Experiment in Trans-Disciplinary Knowledge Production at the University of Ljubljana

Karl H. Müller | Ivan Svetlik | Niko Toš

