EXPERIENCES USING NEXT GENERATION MANAGEMENT PRACTICES[1]

The Future Has Already Begun!

Keynote paper presented at the 9th World Congress of the International Project Management Association, Florence, Italy, June 1992

Russell D. Archibald Archibald Associates
Dr Steen Lichtenberg Lichtenberg and Partners

ABSTRACT

The world today requires from managers a holistic, broader view, and requires using management concepts and practices that are more realistic, provide faster responses to changes and uncertainties, and that can handle turbulence and fuzziness. These practices must reach across artificial boundaries, including political, technological, functional, economic, bureaucratic, cultural, and mental-such as the boundary between logic and intuition (right and left brain). Some of the likely future management principles that have been predicted and described in past years are already in practical use by many senior managers in various countries.

This paper presents personal views and experiences as seen from Northern Europe and the United States. Some important trends toward tomorrow's management practices are highlighted and illustrated through case examples involving managers who have already applied such new and unconventional principles with success.

UNCERTAINTY AND CHANGE REQUIRE A NEW MANAGEMENT MODEL

The accelerating rate of change in all aspects of this world is commonly recognized, and needs no extensive discussion here. Yet our approach to planning and controlling complex projects has traditionally been to eliminate uncertainty and change from our projects, or at least treat them as if changes will not occur. Witness the overwhelming dependence on project planning, scheduling, monitoring and control tools that require single, fixed time and cost estimates "deterministic" methods, in the words of the mathematicians. As stated in a recent book, "We often prefer to do it definite although definitely wrong rather than to do it approximately right."[i]

Probabilistic approaches, and the use of "fuzzy logic", are now beginning to make significant inroads in project management practices around the world, as indicated by the announcement by several project management software vendors of personal computer packages that enable evaluation of PERT/CPM/PDM networks and schedules on a probabilistic basis.[ii] After the first experiences with the initial PERT approach to probabilities, which were not widely accepted, one

[1] *Second Editions are previously published papers that have continued relevance in today's project management world, or which were originally published in conference proceedings or in a language other than English. Original publication acknowledged; authors retain copyright. This paper was originally presented at the 9th World Congress of the International Project Management Association held in Florence, Italy in June 1992. It is republished here with the authors' permission.*

of the first really useful packages was PGLTIMING, available since 1979 from Denmark. It calculates and ranks activities and factors of uncertainty according to their relative influence on the overall project uncertainty. A more recent example, named PLAN[ii], identifies the "high risk path" in addition to the traditional "critical path". Cost engineers are beginning to use range estimating[iv] to measure cost uncertainty and risk.

Fuzzy logic has been used to control cement plant operations in Denmark, to decide when to replace cutting tools in French industry, to make regional planning decisions regarding facilities in Poland, and it is reported to be an infatuation in product design in Japan: "Digital computers operate in a precise world: Everything is on or off, yes or no, black or white. But fuzzy logic can accommodate a more complex reality. It lets computers deal with shades of gray concepts such as about, few, many, and almost. Paradoxically, this makes fuzzy logic faster at precise tasks such as focusing cameras. In short, it is Japan's next weapon in both high and low tech industries. And it works with less software."[v] Equivalent benefits have been obtained in Europe by using intelligent approximations in project planning.

To highlight only a few aspects of traditional project management methods that justify our claim that a new model is required, based on a new logic, consider these points [vi]

- **Monolithic Versus Selective Detail:** Traditionally, large amounts of detail developed monolithically for all aspects of a project are viewed as highly desirable, yet typically the areas of greatest uncertainty may not be treated at all because they are of a subjective nature. The new logic focuses primarily on the uncertainties and requires detailing them. The approach described later produces more realistic estimates based on 100 critical items and factors than conventional estimates based on 1,000 items in a project.

- **Priority To Easy Items Versus the Important Ones:** While all agree that priority should be given to the most important items, in traditional project planning and estimating the reverse is usually true. The important subjective factors are often those with the greatest uncertainty, and the new logic requires giving them priority over the easy, material, more certain ones.

- **Interrelated Areas Are Treated Separately:** Time, cost, resources, and technical performance are closely interrelated at the task, subproject and project levels. Yet traditionally, plans and schedules are prepared (often by scheduling specialists) separately from cost estimates (often prepared by specialized, even certified, cost engineers). Both of these areas are traditionally widely separated from the technology or product of the project, and they in turn are far from the sales and marketing people. The new logic is to keep interrelated areas interrelated, and avoid disturbing the whole, using the systems approach. Figure 1 summarizes some of the key factors involved in the old and the new logic.

MANAGING WITHIN SYSTEMS BOUNDARIES

Many artificial boundaries exist between projects and their environments, including political, technological, functional, economic, bureaucratic, cultural and mental. In addition there are more important boundaries between the subsystems that are involved in any given project. The new logic focuses first on managing within these more natural systems boundaries, and then, when necessary, across the systems boundaries when projects involve multiple systems. This requires

the ability to recognize and define the systems and subsystems to be managed.

HOLISTIC, SYSTEMS THINKING IS A CORNERSTONE OF THE NEW LOGIC

Senge states that: "The essence of systems thinking lies in a shift of mind:

- seeing interrelationships rather than linear cause effect chains, and
- seeing processes of change rather than snapshots."[vii]

Systems thinking is a discipline for seeing wholes.[viii] Applying systems thinking to projects, one learns to see the project as a whole process creating its specified products or results, and the natural subordinate elements as whole subsystems. When we try to define projects by applying the artificial boundaries and divisions listed previously, it's no wonder that the resulting plans are difficult to integrate properly. Further, it is not too surprising that we fail to recognize the most critical areas to be planned, and that we spend too much effort detailing the trivial items.

Holistic thinking not only looks at systems as wholes, but also uses the whole brain: both logic and intuition. Senge says: "Eventually, reintegrating reason and intuition may prove to be one of the primary contributions of systems thinking."[ix] In dealing with uncertainty and change, intuition has proven to be a powerful source of help, especially when a team's collective intuition can be tapped, as described below.

Area Uncertainty	**Conventional logic**	**New logic**
	Should be avoided, or hidden, treated as a necessary evil, and put aside as a separate specialty, like "Risk Management."	Is openly acknowledged as part of the real world. Considered as a most exciting and important part of managing and planning. Dealt with seriously, according to recognized natural laws, and integrated into the planning process.
Quantification	All figures, which can be quantified and calculated are calculated in detail, while "non-measurable" figures are eliminated using relevant preconditions.	Figures are in general evaluated in stochastic terms. All factors of importance are included, whether "calculable" or not. On the other hand, non-significant figures are not specified before they are necessary.
External and internal assumptions	Assumptions are generally transformed into firm preconditions (to allow a normal calculable figure). No firm requirement to the realism of these preconditions.	Assumptions are dealt with in great detail. Their most likely affect and the uncertainty attached are seriously evaluated.
Evaluation	Hunch evaluation is used when absolutely necessary. No formal requirements to the quality of these evaluations.	Evaluations, including hunch evaluations are performed, while using evaluation techniques to ensure against biases.

Figure 1. Summary of old and new[x]

TEAM PLANNING WITH SYSTEMS THINKING FORM A POWERFUL COMBINATION

Little of significance in todav's world is created by one individual acting alone, no matter how brilliant that individual is. It is widely recognized that diverse skills and experience must be brought to bear if complex objectives are to be met, or complex problems are to be solved. These skills and experience reside in two or more people, and these people must collaborate or work together effectively as a project team in order to bring their diverse talents to bear on the project at hand. The project team, in the new logic, works together shaping and planning the project, and not only on its execution. Project team planning assures that "the project plans will reflect a top-down approach using the total wisdom of the project team. which sets the stage for more effective, detailed, bottom-up validation of the plans."[xi]

Charan writes: "In a world of increasing global competition and unrelenting change, many companies have been strong on crafting vision and strategy and weak on delivering results. As they struggle to improve their capacity to execute, senior managers use words like trust, teamwork, and boundaryless cooperation to describe the organizations they, aspire to build....Recently a new term-networks-has entered the vocabulary of corporate renewal."[xii] Networks may mean a set of external relationships, new ways to share information, or "informal ties between managers-floating teams that work across functions and maneuver through bureaucracy."[xiii] Charan goes on to describe how the permanent teaming of managers, disregarding the bureaucratic structures, differs from more formal, traditional project teams, and how such teaming has brought remarkable results to ten large, well known companies that he has consulted to in North America and Europe. The benefits of teamworking that have been experienced in firms with good project management practices are thus being applied at an even broader level throughout large corporations.

When systems thinking is combined with team planning, as in the Successive Principle, the results are remarkable.

THE "SUCCESSIVE PRINCIPLE" IS A PROVEN EXAMPLE OF THE SYSTEMS/TEAM THINKING APPROACH

One of the new generation of management principles, the "Successive Principle", as it has come to be known internationally, was pioneered by Steen Lichtenberg beginning in 1970 in Northern Europe. It is deceptively simple in concept, but requires dedication of the senior people involved to make it work properly. It has been applied successfully in many countries and on a large number of projects in various industries. Here we will briefly describe the Successive Principle and give a few, examples of its application.

Description of the Successive Principle: The Successive Principle is an integrated decision support methodology or process which can be used to address a variety of business problems or situations, and is particularly well suited to conceptualizing, planning, justifying, and executing projects. Its purpose is to produce unbiased, realistic results (time or cost estimates, risk analysis, profitability calculations, key decisions, and understanding of other key aspects or parameters of a project), based on holistic, broad coverage of all factors influencing or involved with the project, including subjective factors, hidden assumptions, and especially areas of uncertainty or potential change.

How It Works: The Successive Principle incorporates the concepts of holistic, «hole-brain, systems thinking and the team approach with the mathematics of uncertainty and probability.

The basic steps are:

1. Identify the Evaluation Subject and Purpose:

The ***subject*** may be

- a set of strategic plans,
- a project in the embryonic or early conceptual phase,
- a response to a request for proposal or bid on a defined project,
- a project encountering unforeseen problems,
- a project entering a later phase of its life cycle, as well as
- other situations requiring a disciplined decision making support system.

The ***evaluation purpose*** may be to decide

- whether to proceed with the project, prepare a proposal and submit a bid,
- what action to take in response to a particular change or problem, and/or
- what risks are involved and what contingency plans are required to mitigate the identified risks, to name a few examples.

2. Form the Evaluation Team: Identify the most appropriate team of people for the evaluation purpose. The team should include persons with knowledge and experience in the major aspects of the evaluation subject, and if possible representing the most involved organizations.

3. Identify, Quantify and Rank the Central Factors of Uncertainty: The team, using its factual knowledge and intuitive hunches and guestimates, stimulated by open interchange of ideas and opposing points of view in a truly collaborative style, first identifies the factors which, in their collective judgment, reflect the greatest uncertainties or unknowns regarding the evaluation subject and purpose. Frequently, this results in a list of "top twenty" items for further consideration. Second, the team members organize, define and quantify each identified factor using the so-called triple estimate (minimum, likely, maximum) and Bayesian statistics to calculate the total result as well as the relative criticality to the result from each factor. This is expressed as the factor's specific influence upon the uncertainty of the result. [xiv]

4. Successively Break Down the Most Critical Factors To Reduce Uncertainty: If any of the critical factors identified and quantified in Step 3 exhibit unacceptable levels of uncertainty (that is, the range between best and worst estimates is too great, or the mean value is too large or too small), the most critical factors are further broken down into their component parts (subsystems) by the team. These sub-factors are in turn quantified and are included in the above ranking in the same manner as before. This successive breakdown, quantification, and ranking is continued until the level of uncertainty is close to the minimum or unavoidable. Logically, no further reduction in uncertainty can be achieved.

5. Present the Results and Make the Decision: The results of the evaluation are presented by the team to the decision maker, who may accept them or require a re-planning. This systematic, disciplined, but wide ranging and intuitive plus factual backup for the results has proven to be extremely persuasive in many diverse settings, and the resulting decisions have proven to be well justified. The results represent a realistic, largely unbiased total measure of the most likely values

of the key parameters under consideration, and the related degree of uncertainty. Experience indicates that a list of the top ten areas of uncertainty will usually encompass all of the most critical items that need to be improved or kept under observation. Another very important but informal result from using the Successive Principle is attainment of a higher level of mutual understanding, trust and consensus among the evaluation team members. This improved potential for cooperation is utilized during execution of the project, if the decision is made to proceed, for better commitment, teamwork, motivation, and more productive response to unforeseen events and changes.

CASE EXAMPLE: WINNING A HIGH-TECHNOLOGY SYSTEMS PROGRAM CONTRACT

Several typical applications of the Successive Principle are given here to illustrate its power and benefits. The first case involves a medium-large defense program, which night even be termed a mega-project (two-digit billions in US dollars), in a European country. The client country announced in the early 1980s its program for the radical modernization of a part of its defense system, and invited selected companies and joint ventures to a pre-qualification process. A company in a smaller country that was interested in proposing on this effort had a long experience and good competence in a part of the program, but suffered from a lack of know-how in other areas.

Initial Use of the Successive Principle: This company started a search for joint venture partners in other countries, and began negotiations with potential partners under the condition that the company would be the prime coordinator. At the same time the project manager, his senior management and key project persons performed their first analysis sessions using the Successive Principle to identify, clarify,, and rank the business risks and opportunities imbedded in the venture as well as to estimate realistically the expected profit.

Useful Results: After the analysis sessions the participants found themselves changed. To a higher degree than before this group of managers and key project persons considered themselves as members of the same team. They also shared a deeper insight into the project, and found it to be most promising, but with a scope and complexity far beyond their previous projects. They conclusively established a firm team commitment to win the contract and then implement the project successfully. The project manager thus found himself having unusually strong support.

Negotiations With Partners: The knowledge of the primary problem areas obtained during the analysis was now used to support the company during its final negotiations with the joint venture partners, which soon resulted in agreements with companies in several countries.

Joint Venture Use of the Successive Principle: After a successful pre-qualification of the proposed joint venture (JV), a JV project group of key persons was organized and a new series of analysis sessions was conducted using the Successive Principle. Guided by an updated "top ten" list of uncertainty areas, the group strengthened itself as a team and at the same time worked systematically to clarify and utilize the largest potentials indicated in the top ten list.

A Key Factor: The Client Country: One of the top ten factors was the degree to which the project was "colored" by and anchored in the client country. So the local share and local partners (those located in the client country) were given high priority and much attention at an early stage. In this connection it was found important to seek out not only competent, but also prestigious

local partners. Because the joint venture came so early to this conclusion they could freely seek out and agree with the best of the local partners. This later proved to be a most important factor to final success.

Winning the Final Competition: The next stage of the competition left three remaining candidates for the project: this joint venture and two competitors, both based in very large countries. These two competitors therefore were able to use considerable political pressure on their behalf, including visits of their countries' prime ministers. Parallel to the political side the client negotiated with the three candidates using the conventional forms of pressure. During this critical period, current analysis sessions (using the Successive Principle) allowed the PM and his key persons to know exactly where he could give and where to hold fast, also keeping in mind the relative perceived benefits on each point as seen from the client's point of view. Most importantly, the joint venture knew, through the analysis results, the most realistic, ultimate limit of price reductions.

According to the project manager this knowledge, together with the top ten lists, the teambuildmg effect and the other benefits of the analysis sessions, were decisive factors for winning the contract, in spite of the handicap of being a considerably smaller company from a relatively small country.

The Outcome To Date: The program has now been under implementation for some time. The updated expectations of the results are reported to be positive, and still corresponding to the earlier analysis results.

CASE EXAMPLE: A HIGHTECH, MULTIUSE ARENA PROJECT

The Design Concept: A European city needed a high-tech, multi-use arena that could also function as a landmark. This materialized in a design competition in the first part of the 1990s. The winning design was unique in many respects, reflecting an integration of the artist's and the architect's work. The estimated costs for this 10,000 seat arena were at this point in time about 80%, using 100% as the actual final amount measured on the same cost index.

Funding the Project: During the next four years the municipal owner discussed the project, found the financial means, and then was ready to proceed. Meanwhile the consultants had further developed the concept to meet the needs of many different sports, including ice hockey, basketball, and horse riding, as well as all forms of dance, concerts, exhibitions, and so on. A high degree of mechanization allowed minimum lead time between various events.

Initial Use of the Successive Principle: At this point, the newly established project manager initiated a two day analysis session using the Successive Principle to evaluate realistically the expected costs and related uncertainty before the detail design could start, and before he committed himself to the project. The result stopped the whole project! The developments during the four years and/or optimism in the original budget meant a doubling of cost, from 80% to more than 150%. Additionally, the uncertainty of the cost was unacceptably high (with a standard deviation of about 15%).

Redesign and Re-Analysis: A redesign followed, with the owner in parallel seeking additional financing. The new goal was to keep the budget safely below 110%. One year later the new concept was again analyzed. The result this time was acceptable: with a cost of 95% expected and

a 12% standard deviation it would be possible to keep the budget limit of 110% with a sufficiently safe margin of reserves.

Detail Design and Contract Award: One year later the detail design was ready and most bids received. An update analysis was performed, using the Successive Principle, resulting in an estimate of 105%, plus or minus 10%. After a short final cost cutting process down to 99%, the contracts were signed and the construction period began.

Results Achieved: The completion target date was set so that the first large event could be held in the arena 23 months from the start of construction. In reality, the first event was realized in only 19 months! The project manager concluded that the identification and discussion of the critical factors by the project team using the Successive Principle contributed significantly to the very successful implementation.

After a busy first year of operation with several national and international events, the final accounting was made and accepted. The result was a cost of 100%, which was 10% below the ultimate limit and only 1% from the expected value. This was not pure luck, but rather the result of timely cost follow-up, control of marginal project changes when necessary, plus the assistance of the Successive Principle analyses.

SUMMARY EXAMPLES:

Optimization of Strategic Plans: A European telephone company is gradually being moved from a monopolistic to a competitive situation. Four of its regional divisions have used the Successive Principle to analyze the potential commercial strengths and the profitability of their long range plans and alternatives. They identified and ranked the positive strategic potentials as well as the risks. The Successive Principle was chosen here because of its ability to fully integrate the subjective factors into the analysis. The positive results achieved have also been produced in a similar procedure being started at the top level of the organization.

Strategic "Survival Plans" for a Large Shipyard: Not many years ago the management and owners of a large, state owned shipyard decided to fight for their existence as a free commercial venture in the open market. They initiated a series of analysis sessions using the Successive Principle. During these sessions the senior management and some experts identified and discussed potentials and risks, as well as the external long range situation. Various strategic plans were outlined and their expected long range economic consequences were estimated. The top ten list of "interesting" areas or factors guided the group into relevant detailing during the following sessions. Consensus was finally achieved about a preferred strategy, including an organizational restructuring, which has since been implemented. Today, this shipyard is still going strong in its new shape.

Export of Large, High Tech Telecommunications Systems: A large telecommunications company suffered ten years ago from frequent serious delays in their deliveries of systems to foreign clients, a situation which began to threaten the company's competitiveness and reputation. The management decided to use the Successive Principle as a means to establish a more efficient planning and cooperation process. During a five year period several hundred project managers and other key persons were trained in the Successive Principle, initially using consultants and then using in-house experts. Today, after another five years, management reports that projects are now completed without surprises. The company's joint venture partners and

suppliers, after observing the results, also started using the same approach.

Summary: The above examples are selected from about 300 applications of the Successive Principle over the past 16 years, all with documented records of good analysis performance. There have been no cases of unpleasant surprises when comparing the analyses to the actual results, except that the projected outcomes have often been surprisingly close to the actual achievements-especially when comparing projected and actual project completion dates.

CONCLUSION: HOLISTIC MANAGEMENT HAS ARRIVED

Projects fail to meet expectations too often because the practices and tools being used do not accommodate the uncertainties and change that are prevalent in today's project environments. A new management model based on holistic, systems thinking and using fuzzy logic, probabilistic methods, and teaming of the people who have the best knowledge of all major aspects of the project, is required. The Successive Principle exemplifies an approach which embodies these concepts, and which has been applied to a large number of various, complex situations. Further refinements of this approach can certainly be expected, but the key concepts it embodies are rather universal:

- Project objectives, including the intangible, informal ones, are given high priority.
- Deep involvement of the key interested persons is required.
- All potential factors which may significantly affect the project are dealt with, including those that are uncertain, fuzzy, or normally hidden within key assumptions.
- Uncertainty is accepted, not only as a natural, unavoidable element, but as a highly useful and important matter, and the most uncertain factors. handled strictly according to Bayesian statistical laws.
- Intuition, whole-brain and team thinking are encouraged and accepted.
- Strict "top down" planning is applied, with detailing of only

Experience with several hundred projects over a 16 year period in using the principle shows that, compared with the use of traditional project planning and evaluation methods:

- Far more correct decisions are made.
- Consensus is reached more quickly and efficiently and produces previously unused synergistic benefits of good cooperation and motivation.
- A far better understanding of and adaptability toward changes (for example, during contract negotiations) is produced.

The new project management principles are in full operation. Holistic project management is starting to take over.

REFERENCES

i. Lichtenberg, Steen, "Experiences From a New Logic in Project Management", Dimensions in Project Management, Reshke, H. and 11. Schelle (Editors), SpningerVerlag, Berlin, 1990, p. 144.

ii. These packages basically revert back to the original PERT concept of making three time estimates for each activity; today, however, the statistical treatment of these estimates is reported to be mathematically sound, unlike the way the original PERT methodology worked.

iii. Plan Systems International, 11693 San Vicente Boulevard, Suite 350, Los Angeles, CA 90049 USA.

iv. For a discussion from a cost engineering viewpoint of using range estimating to measure uncertainty and risk, see Michael W. Curran, "Range Estimating", Cost Engineering (RACE), Vol. 31/No. 3, March 1989, p. 18.

v. 5 Anderson, Larry, and Neil Gross, "Why 'Fuzzy Logic' Beats BlackorWhite Thinking", Business Week, May 21, 1990, p. 92.

vi. Based on Lichtenberg, Steen, Op. Cit., pp. 144-146.

vii. Senge, Peter M., The Fifth Discipline The Art and Practice of the Learning Organization, Doubleday/Currency, New York, 1990,1). 73.

viii. lbid, p. 68.

ix. lbid, p. 169.

x. Ibid, p. 147.

xi. Archibald, Russell D., "Project Team Planning The Need, Methods and Benefits", Dimensions in Project Management, Reshke, H. and H. Schelle (Editors), SpringerVerlag, Berlin, 1990, p. 230.

xii. Charan, Ram, "How Networks Reshape Organizations For Results", Harvard Business Review, Sept. Oct. 1991, p. 104.

xiii. Ibid.

xiv. Correct use of the methodology eliminates the need for correlation factors, because the user deliberately creates stochastic independence between items and factors.

About the Authors

Russell D. Archibald

Archibald Associates
San Miguel de Allende, Mexico

Now 92, with careers spanning more than 70 years, **Russ Archibald** has had broad international experiences in piloting and designing aircraft and corporate engineering, operations, program and project management. His three project management related careers have been *Military/Aerospace (19 years), Corporate Engineer & Executive (17 years)*, and *Management Consultant (33 years to date)*. Russ has consulted to a wide variety of large and small organizations in 16 countries and he has resided in the USA, France, Mexico, Venezuela, Panama Canal Zone, and Peru with Marion, his wife of 70 years. For the past 23 years they have resided in San Miguel de Allende, Guanajuato, Mexico.

Russ is founding member number 6 of the Project Management Institute/PMI, which today has 470,000 members in 205 countries and territories. He presented the first paper, *Planning, Scheduling and Controlling the Efforts of Knowledge Workers,* at the formation meeting of PMI in 1969, and was President of the PMI Southern California Chapter in 1991-2, founding member of the PMI Mexico City Chapter in 1996, and in 2006 was awarded the PMI *Jim O'Brien Lifetime Achievement Award.* A PMI Fellow and Certified Project Management Professional, he co-authored with Prof. Dr. Jean-Pierre Debourse the 2011 PMI research report *Project Managers as Senior Executives*. He was also a founding member in 1970 and is an Honorary Fellow of the Association of Project Management (APM/IPMA-UK).

Russ is co-author with his grandson Shane Archibald of *Leading and Managing Innovation-What Every Executive Team Must Know about Project, Program & Portfolio Management* (2nd edition CRC Press 2015, 1st edition 2013 also published in Italian, Portuguese and Spanish); author of *Managing High Technology Programs and Projects* (3rd edition Wiley 2003, also published in Italian, Russian, and Chinese), and co-author of *Network Based Management Information* Systems *(PERT/CPM)* (Wiley 1967). He has contributed chapters to 15 books edited by others, and presented 88 papers at many PMI, IPMA and other conferences in many countries. He holds BS (U. of Missouri 1948) and MS (U. of Texas 1956) degrees in Mechanical Engineering. Russ was awarded an honorary Ph.D. in *Strategy, Program, and Project Management* from the *Ecole Superieure de Commerce de Lille* in Lille, France in 2005. See russarchibald.com. Russ can be contacted at russell_archibald@yahoo.com

Dr. Steen Lichtenberg

Denmark

Dr. Steen Lichtenberg, PMI mb. no. 661, hon mb. & former president of IPMA. As an international management and risk management consultant, Steen is recognized as a leading researcher and expert practitioner in risk management. He consults, writes and speaks widely on the topic and has made an innovative contribution to the field, the Successive Principle, today internationally widespread.

Steen Lichtenberg has 40 years' experience in research and risk management consulting providing support to public and private clients in many major industry sectors, including construction, telecommunications, transport, energy, IT, defense and government. Steen´s input includes in depth project analyses including accurate statistical prognoses of the end results as well as further possibilities of optimization and provisions against risks. He works both on ad hoc tasks or on implementation.

Steen's contributions to the management discipline over many years have been recognized by a National Gold medal, and honorary membership of IPMA. His work has led to establishment of a governmental sponsored research program, Concept, in Norway which since 2002 aims to follow and further improve the basis for large public decisions.

Dr. Lichtenberg can be contacted at steen@lichtenberg.org