

Executive Briefing on
The Successive Principle

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What is the Successive Principle?

**A Proven Process to
Reduce Uncertainty,
Minimize Risk,
Capitalize on Opportunities, and
Assure Project Success.**

Uncertainty

- Exists in every endeavor of any size.
- Can be quantified and reduced to manageable levels of risk.
- Provides important opportunities for exploitation.
- The Successive Principle enables effective management of uncertainties.

The Problem

Too many projects of all types in government and industry result in excessive cost overruns and schedule delays.

The Causes

- Many specific causes have been identified.
- One major underlying cause is ***uncertainty*** regarding:
 - a specific project's objectives, scope, deliverables, cost and funding, schedule, technology; and
 - the project's overall environment, including political, technological, functional, economic, bureaucratic, cultural, geographic, and mental conditions and situations.

The History

- Traditional applications still continue with deterministic (single estimate) methods for scope, cost and schedules.
- Early attempts (as in PERT) to use range estimates and probabilistic methods were not successfully sustainable.
- Monte Carlo methods for risk analysis are used today with some success, but high project failure rates continue across all project types and areas of application around the world.
- A few project management software applications today do provide range estimating capabilities but the failures continue.
- A larger set of psychological pitfalls in the use of subjective expert evaluations (wishful thinking, etc.) has been identified as a major reason for failures.
- A procedure to eliminate these pitfalls is a vital part of the Successive Principle.

The Successive Principle

This proven approach:

- Identifies the important uncertainties in and surrounding a proposed endeavor and reduces them to the minimum level.
- Establishes achievable objectives regarding scope, cost and schedule.
- Enables a most realistic prognosis in statistical terms of the future outcome.
- Enables a well informed decision whether or not to proceed with the proposed endeavor, accepting the quantified risks. This includes a ranked list of actual uncertainties.

The Six Steps to Apply the Successive Principle

Step1. Identify and define the evaluation subject/proposed endeavor:

- Project, program, major problem to be solved, strategic plan for an enterprise, other.
- These preparations include a summary of the task, and study of existing conventional top level plans and/or budgets as means of preparation of the participants before the actual workshop.

Step 2. Identify and Assemble Members of the Evaluation Team

- Bring together a broad team of persons who have the desired knowledge and experience in the major aspects of the proposed endeavor and its total environment.
- If possible they will represent the most involved organizations.
- The following three steps (3, 4 and 5) run as a workshop.

Step 3. Identify, Quantify and Rank the Central Factors of Uncertainty

- **First** the Evaluation Team, guided by a qualified **Facilitator**, identifies through a brainstorming process the factors which, in their judgment, may reflect an-uncertainty or unknown regarding the evaluation subject and purpose.
- **Second**, the team members organize the factors into main groups, define and quantify each group 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.
- This result is visualized in a **top ten list of the most critical uncertainties**.

Step 4. Successively Break Down the Most Critical Factors to Reduce Uncertainty

- **Using a systematic top-down approach**, the participants in successive steps use their factual knowledge and intuitive hunches and guestimates, and stimulated by open interchange of ideas and opposing points of view in a truly collaborative style. This process is tailored to eliminate the before-mentioned many pitfalls.
- **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.

Step 5. As a Final Stage the Participants May Suggest an Action Plan

in which the positive uncertainties are further exploited, and including protective actions to reduce the “negative uncertainties”/risks.

Step 6. Present the Results to the Decision Makers

The results of the evaluation are presented by the team to the decision makers, who may accept them or require a re-planning, often supported by the suggested action plan.

The Facilitator Role

- A qualified Facilitator is vital to successful application of the Successive Procedure.
- Develops an atmosphere of trust, openness, and sharing of ideas.
- Has practical knowledge of evaluation pitfalls and the use of Bayesian statistical analysis.
- Persons can be trained quickly to successfully fill this role.

Bayesian Analysis

- Three estimates (time, cost, event occurrence, other) based on expert knowledge, opinions and intuition are used to calculate probability distribution and mean values.
- Proper statistical methods are applied.
- Uncertainties are quantified and ranked for both risks and opportunities.
- Decisions are based on much improved knowledge.

Time Required to Apply the Successive Principle

- Initial application of this approach typically requires one, two or three days for Steps 3, 4 and 5 for a major international project.
- As experience is gained with its use this often is reduced to one day and in certain situations half a day.

Traditional Project Management Planning and Control

- The results of the Successive Principle analyses are used as the top level basis for application or revision of existing traditional project planning and control methods and systems.
- Update workshops may be used annually or quarterly as a top level follow up.

Benefits Produced

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.

Successful Experiences

- Since 1990 the Successive Principle has been successfully used throughout Scandinavian countries by [Lichtenberg & Partners, www.Lichtenberg.org](http://www.Lichtenberg.org) and internationally by their UK partner, Peter Adlington, www.adlingtonassociates.com, and other members of the Futura-one group www.Futuraone.com to identify the end results, optimize major projects and to support major strategic and operational decisions. Their software Futura Nova 4.8 supports application of the Successive Principle.
- The following slides present some examples.

Futura Nova Software Tool

- [Futura Nova](#) follows the process steps which are used in the Successive Principle Method. It enables qualitative and quantitative data to be modeled live during a workshop session. Results can be generated on the day in the form of Word reports.
- The screen picture shows the Scenario Analysis input windows which are used to capture Base Case assumptions and the related opportunities and risks in the Qualitative Analysis stage. It also shows a typical probability S-curve from a quantitative model.

Swedish Nuclear Power Industry

For the past 15 years SP has been applied to the Swedish National Nuclear Decommissioning Program and its projects for all existing Swedish nuclear power plants. The program completion date is 2084.

Swedish Energy Company

This company ,with both a nuclear and coal fired plant in reserve, decided to buy a costly primary spare part to their nuclear plant in order to reduce risk of starting the costly coal fired plant. This decision proved beneficial while analyzing its 5 year budget with the SP method.

Scandinavian Countries

- In Scandinavia over the last 30 years 1,000 projects (including IT projects) have been analyzed using the SP method.
- The projects were largely completed very close to the analyzed mean values for their working budgets.

Ericsson Telecommunications

- This large multinational has achieved good benefits from using SP on many projects.
- Ericsson has experienced two additional major benefits using SP when handing off a project from the planning team to the executing team and then to the marketing and sales team, each with different general attitudes and views; from the SP analysis, formed as a workshop with these teams together, with the aim to monitor the status situation:
 - First, consensus on the status situation is more easily obtained between the teams, because they all have participated in the evaluations;
 - Second, each team obtains a deep insight into the nature and heart of the task and its risks.

Large Norwegian Contractor

- Mr. Aftrett, the company founder of AF Group (Norwegian contractor with annual turnover of US\$1.1 billion), has embraced the SP method for many years:
 - In 2006 he upgraded SP to a primary management tool. The average profit then doubled from 2½% to more than 5 %.
 - They make hundreds of analyses per year including quarterly project and portfolio updates. Due to their routine they analyze a larger project (more than US\$6m) in a forenoon workshop; for very complicated offshore projects they use somewhat more time.
 - They earned 8.3 % in EBIT last year.

Oslo Spectrum, Multiuse Arena

- For this design and construct project the original estimate was US\$43 million.
- The SP analysis of the detailed plans produced a mean value estimate of \$114 million.
- After re-planning, with help from further SP analysis, the mean estimate was \$76 million, which was the actual official cost at completion.

1994 Lillehammer Olympic Games

- For the these Games the initial investment budget estimate rose from \$230 million to \$385 four years before the games.
- An SP analysis produced an unacceptable mean final cost estimate of \$1,230.
- Reorganization and further SP analyses over some months produced an accepted mean budget value of \$800 with an official reserve of \$90 million.
- The final official total cost was \$800 and the reserve was used to operate the facilities after the games.

Public Projects in Norway

- Since 2000 it is obligatory to use a quality assurance procedure, based on SP for all large-scale Norwegian public-sector projects above \$70 million prior to the final decision to finance and execute each project.
- By 2013 32 of 40, or 80%, of these major projects (including IT projects) were completed within the officially approved budget. This equaled the original ambition.

Highway Program in Denmark

- In Denmark a prognosis for every large highway/road project during the period 2002 to 2007 (total program value of \$2.3 billion) was established using the SP process.
- By 2013 40 of these projects were finished.
- The end result of these 40 projects fully confirmed the prognoses. The average optimization effect proved to be about 5 %.

Various Types of Endeavors Benefit from Successive Principle Analysis

- Large projects and programs.
- Quality assurance of budgets, schedules, profitability analyses.
- Action planning for improvements of productivity, safety and/or competitiveness.
- Ranking of alternative solutions to major problems.
- Team building and consensus support.

To Fully Understand and Test the Successive Principle

- Invite [Dr. Steen Lichtenberg](#) to present a one-day workshop.
- Select a project or other subject endeavor involving great uncertainty and test the SP process.

Further Information on SP in these Peer Reviewed Papers

- ["Successful Control of Major Project Budgets"](#) by Dr. Steen Lichtenberg, after accepted peer review, has been published in MDPI / Administrative Sciences on 8 July 2016.
- ["Successive Cost Estimation – Successful Budgeting of Major Projects,"](#) Ole Jonny Klakegg and Steen Lichtenberg, 29th World Congress International Project Management Association (IPMA), 28-30 September – 1 October 2015, Panama.

Further Information on SP

- [“Experiences Using Next Generation Management Practices: The Future Has Already Begun!”](#) Russell D. Archibald and Dr. Steen Lichtenberg:
 - Keynote paper presented at the 9th World Congress of the International Project Management Association, Florence, Italy, June 1992.

Book on the Successive Principle

Proactive Management of Uncertainty Using the Successive Principle: A Practical way to Manage Opportunities and Risks, by Steen Lichtenberg.

- ISBN 87-502-0822-5 1st Edition 2000, 334 pages
Polyteknisk Press Email: poly@poly.dtu.dk
www.polyteknisk.dk (click on the UK flag there)
- See a review of this book by Russell D. Archibald [here](#) (then scroll down to this title.)