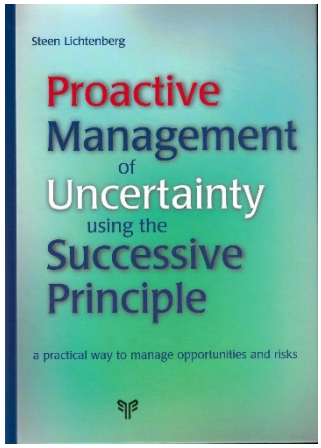
The Successive Handbook:



Proactive Management of Uncertainty Using the Successive Principle

By *Dr. Tech Steen Lichtenberg*

Update, May 2025

This document is written by Dr. Tech Steen Lichtenberg in 2015 and later updated by M. Sc. Henrik K Søndergaard.

General Experiences
The effectiveness and accuracy of the principles and procedures described in the handbook are positively confirmed since the publication in year 2000 and widely used in Scandinavia.

Success in Norwegian major public projects.
Since then, numerous large and very large projects have been analysed (1000'ands). The accuracy has been surprisingly good. The success in Norway was so great that the government year 2000 decided that all governmental-financed projects above 500 million NOK, or 83 million EUR, inclusive of IT projects, should undergo analyis via this method as a quality control of the budget at KS2 (Quality Step 2).

The ambition was to change the normal international rate, 10-20 %, of keeping to budget to 80%. Thirteen years later an official report documented that 32 out of 40 projects, or 80 per cent, actually had been accomplished to budget (Update Jan 2025: 70% of 111!).
Google: 'NTNU concept Kostnadsoverskridelser og forsinkelser i store statlige prosjekter – en oppdatering'.

Success in Danish read projects.
A similar Danish result was accomplished by the national Road Authorities (Vejdirektoratet) during 2002-2007. Besides the accuracy, it also showed the practical effect of the identified optimization possibilities. The final outcome of 40 larger road projects showed that 80% of the projects finalized below budget. Another report stated further an average savings of 7%! These were most likely a result of the project managers' exploitation of the identified optimization options.

As demonstrated in the above example, it has been an interesting side effect that the analysis procedure has shown efficient roads to further improvements of the project, exploiting possibilities as well as securing against economical risks.

Simplified Procedures
The classical normal procedure has worked well towards larger and major projects as well as towards strategically important projects. This is demonstrated by more than thousand full-scale analyses of projects of all kinds. Even IT projects has been kept under control. However, it is a large and difficult resource effort to gather 12 – 20 busy key persons for a workshop of 2-3 full days.

Lesser efforts have been a frequent demand in cases of minor and medium-sized projects. Recent research supported by practical experiences has resulted in solutions to this demand. Below a simplified version of the normal procedure as well as a "mini-version" is outlined.

The method can be scaled, e.g., as suggested in "Riktlinje för kostnadsstyrning i projekt", p 26, Tabel 6, Västra Götalandsregionen.

A considerable simplification is possible in many situations where a good traditional estimate is available for a project, which is reasonably well defined. The estimate af the Base Case should be under condition of today's situation and without any contingency or risk addition.

It has been documented that the individual uncertainties of the items extremely seldom are of any importance compared to the many General Uncertainties. The reason is partly that the projects current situation is rather well known, partly because even the larger items are smaller than the cost of the whole project. Therefore, this estimate is able to function as the base estimate.

A slim process (By Henrik K Søndergaard)
The focus is the suggested approach below is the General Uncertainties.

The process for less complex project is suggested as follows:

1) Define two teams:
    a. Team 1 for preparation: the PM and 1-2 principal engineers
    b. Team 2 for the analysis: includes Team 1 and 2-3 more stakeholders.
        i. Book Team 2 say 1-2 weeks prior to the analysis.

2) Team 1 collects data and do a first estimation of deliverables:
    a. Make a short summary of the project, its nature and situation.
    b. Define the project deliverables in a WBS (say 5-10 elements) drafted by the PM.
    c. Describe the assumed project state. That is the reference situation (base case) about resources, organisation, available competences & experiences etc.
    d. Estimate the expected values of the WBS elements. If some have important uncertainties, then make triple point estimates of these.
    e. Define and describes say 4-6 common General Uncertainties (E.g., A) Competences & experiences, B) Technology, C) Quality and requirement Control, D) Interphases and Z) Analysis Quality.

3) Team 2 does a say 1-3 hour workshop:
    a. PM gives a brief project, walking through the WBS and do Q&A with the team.
    b. The team do triple estimates of the General Uncertainties in silence.
    c. PM compiled the data into a spreadsheet.
    d. The top 3 uncertainties are assessed for breakdown into sub-elements (not for minor projects)
    e. The Top3-5 uncertainties are subjected to proposals of mitigations.
    f. PM conveys the results for a brief discussion, herunder define robustness in the budget (say P65, P75 or P85)
    g. PM finalise the analysis report and do Q&As with the team.

4) PM present the analysis report to the decisionmakers for: Acceptance, Recycle or Reject
5) The analysis is revisited, e.g., when major changes take place, prior to gates or per quarter.

Ad 3 and 4) Assuming that the teams are trained in the method.
Ad 3.d) Pereferable a common set for groups of similar types

The “slim version” is relevant in less important cases or towards projects that are very well known.

Costs – Certainties & uncertainties
Figure 1 shows the varius components of cost in general terms.

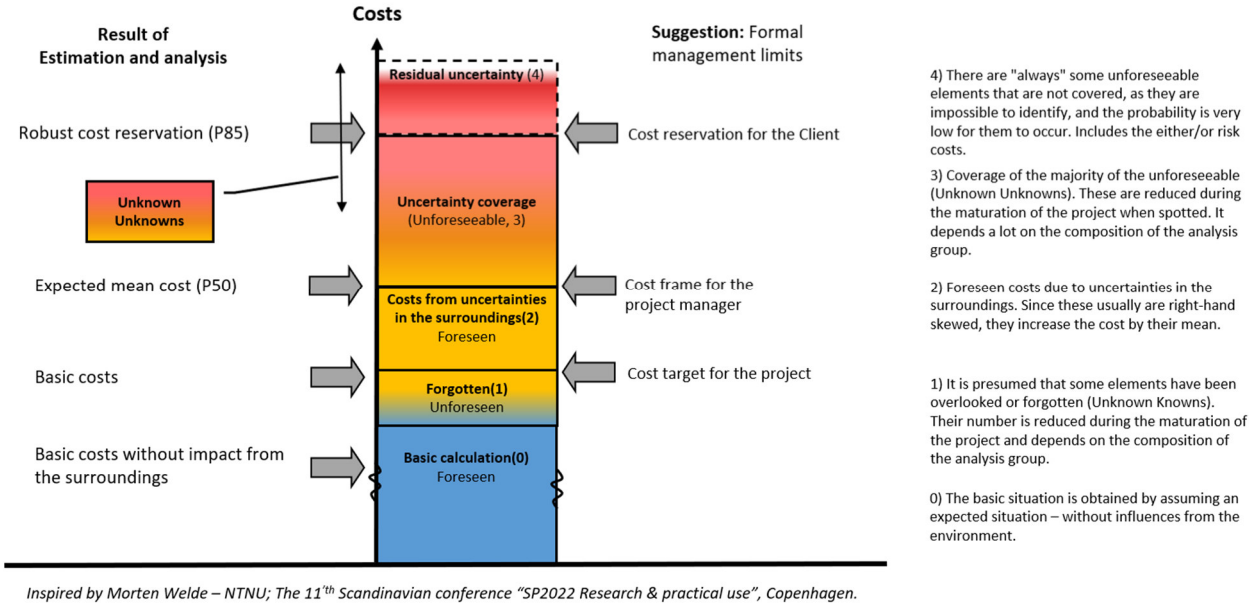


Figure 1: Break down of budget

Of course, this approach will not result in the normal full accuracy but often a useful up-qualification of the total cost and may be a warning about some potential financial risks. For minor projects this will be sufficient for budgetting.

Note, that special care must be taken in respect of a portfoilo of projects, in reserving robustness buffers.

Sample: Norwegian 2nd largest constructor
The Norwegian contractor the AF-Group.no is an example of using this approach. This approach supported a drastic improvement of profit (EBIT). Since they implemented the principles in 2006, their EBIT changed from a level of 2.5 % to a stable 6%, both figures are three-year average – and at the same time the company doubled their turnover mainly by acquisition of other companies. This is breathtaking result!

The improvements was based on the method and by implementing a supporting risk culture throughout the organisation to ensure ownership for making this happen (still the case in 2024).

A Few Problems as Experienced
Frequently there are many engineers and other technical-oriented persons as participants in analyses. By nature, they identify General Uncertainties of largely those of technical nature, while the softer and more

indirect issues like the effect of own organization and its policy will not be identified properly. As the effects of these issues are most often important, it is important to make sure that some participants are experienced generalists and that one of them will function as the “devil’s advocate”. In this situation, it is important to follow the suggestion in the following text.

Many analyses understate the uncertainty. The reason is that an important “rule of the game” is violated. Every successive step result in a triple estimate for each participant. It is logical and correct to use the average of all these most likely values in the calculation to follow. It is tempting to do the same with the max and min values or to apply a “typical” value for these extreme values, often after a discussion in the group.

Nevertheless, it is a major failure, which will result in a serious underestimating of the final uncertainty and to a lesser part also the mean value. The reason is that it is a well-documented pitfall to underestimate how extreme they in fact often are. The evaluated range between max and min is generally less than half as large as the correct size. To compensate for this, the most extreme values among all participants must consistently be used in the following calculations, choosing the lowest minimum and the highest maximum values for each post (General Uncertainty and item).

Software Support

The statistical calculations are typically time-consuming to calculate manually. This is critical in a workshop situation under time pressure because of the key persons. Unnecessary pauses must be avoided. For this reason, it is important to use relevant software. The simplified versions and the “mini-version” can be supported by fairly simple Excel programs. Many such programs are available but are unfortunately not usable as they can typically only handle summation of items. The program must be able to manage factors in percent of the base total or absolute values.

Excel programs only support the quantitative part of the procedure and not the important and time-requiring qualitative part during which the many general issues are identified and organized. Furthermore, they cannot easily be built to manage several levels, each with both items and factors. In addition, of course, not network-based time analyses.

Futura Nova

A broad support program, Futura Nova, built specifically to support the whole procedure, is available. It supports analyses of cost or resources, network-based analyses of project duration, profitability analyses, and proper risk analyses of catastrophes etc. It delivers a report in Word right at the end of the analysis.

The program can facilitate estimation of costs, hours and also estimation of duration of a time plan, by using Monte Carlo Simulations.

Many consultants have used the programs for years with a good result. It is supported and sold by a Northern Europe group of consultants: Futura One, through senior consultant Erling Hjallen, Kongsberg, Norway (www.Futuraone.com) or direct by mail: erling.hjallen@futuraone.com.

Anslag 5.0
The Norwegan "Statens Vegvessen" have developed a budget toll called Anslag. The method is based on Anslagsmetoden handbook R764 that uses the Successive Principle.

The program can facilitate estimation of costs by Monte Carlo-Simulations, but does not support estimation of duration of a time plan.

NTNU drives a training course for people wanting to facilitate analysis using the program and approach. Contact: olav.torp@ntnu.com or agnar.johansen@ntnu.com

---

Addions in the E-book version:

- Selected references: Some Supplementary References (2024) p326
- Index list
- Some figures updated with colors for enhancing the messages

Updated 2nd edition
The handbook "Proactive Management of Uncertainty using the Successsive Principle" can be bought:

- as an E-book at https://molio.dk/produkter/boger/bogkategorier/okonomi-og-kalkulation
- as a hard copy at www.compilot.dk

The Danish version is also available at Molio.dk and in Hard Copy via www.compilot.dk

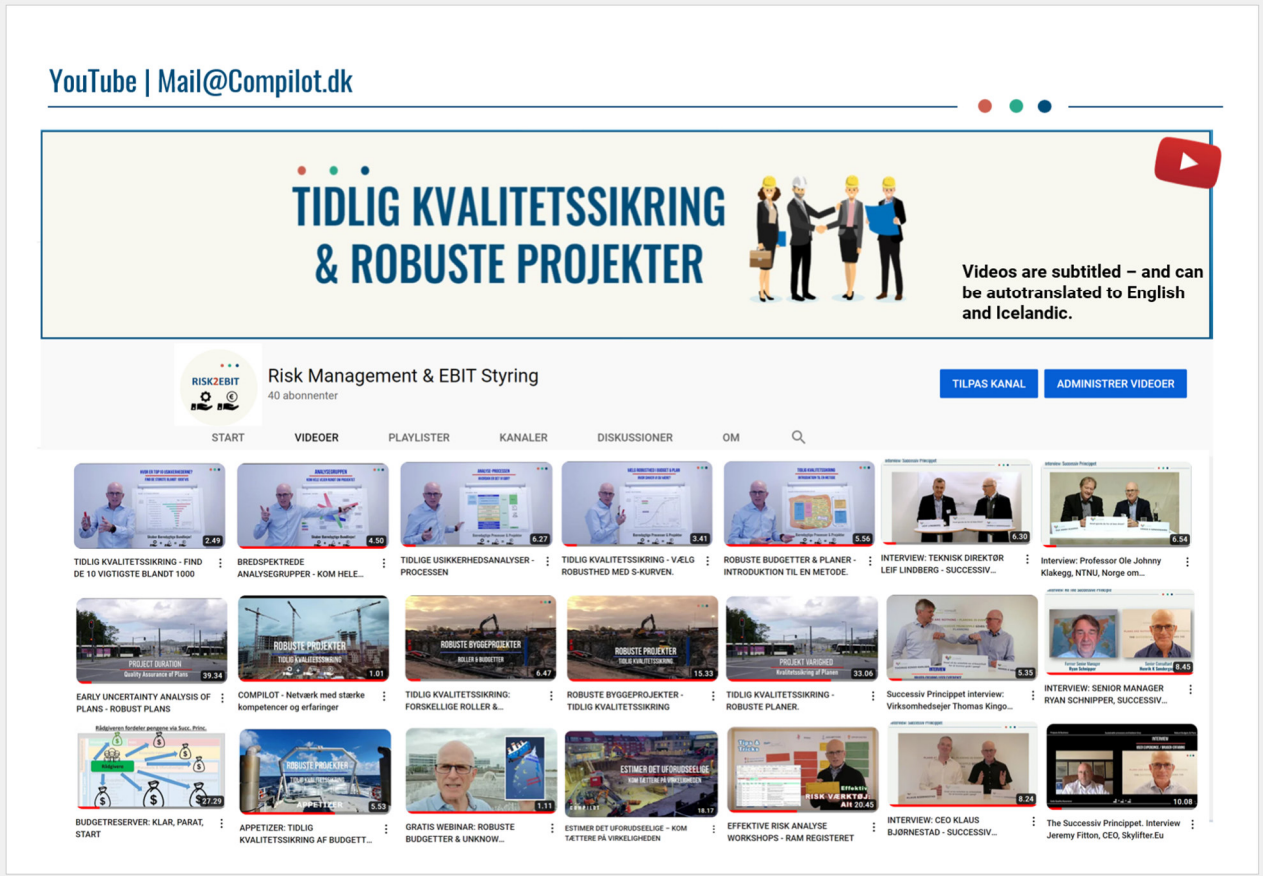
Sweedish book
A Swedish book *SUCCESSIVPRINCIPPEN – an handbook is available.*
We recommend the book for getting more into practical use of the Successive Principle.

By Henrik Erdalen and Thomas Lillskogen
Forlag: Svensk Byggtjänst

Additional inspiration can be found on two YouTube channels:

'Risk management & EBIT Styring'

Most videos are subtitled and can be auto translated by YouTube to many languages



There is e.g., a serie explaining some of the most important elements in the method. Other videos explain the method in more details.

------- oooOooo -------