

# **FROM SW PROCESS ASSESSMENT TO KNOWLEDGE BENCHMARKING – A DECADE OF (NOT ONLY SOFTWARE-RELATED) PROCESS MANAGEMENT**

**Günter R. Koch  
Managing Director of the  
Austrian Research Centers  
Vienna**

At the turn of the year 1989-1990 I spent the days of the winter break of "my" software house preparing a project application for an EU software improvement programme. The aim was the general and measurable increase of the "culture" and "efficiency" of software engineering.

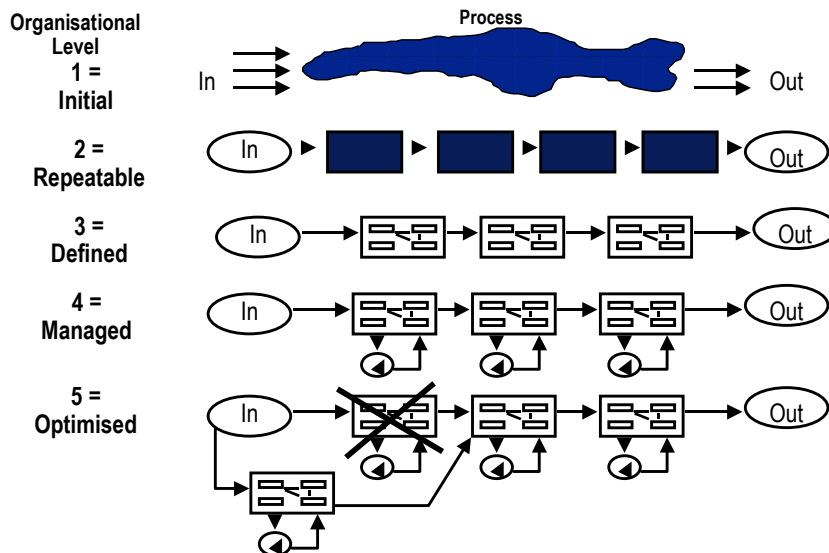
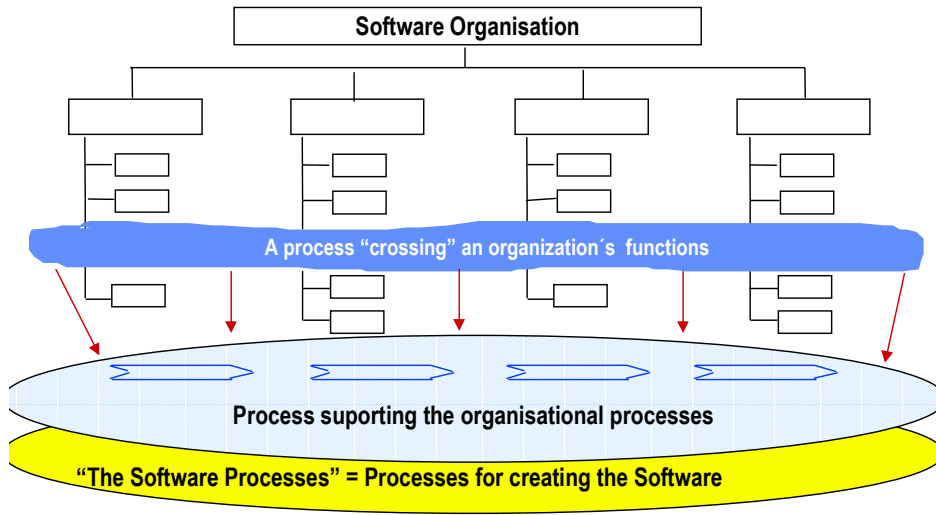
The proposal for developing a Software process improvement method was based on the following fundamentals:

- The basic subject of an analysis of the software process is, on the one hand, the individual and intellectual design process and, on the other, the organisation and management-related process of specifying, designing, implementing, and testing of software
- The influence on, and the change of, such processes is to be organised in a way that it triggers a bottom-up "bush-fire process of change". In analogy with the term "booting" in the computer world, or, even more adequate, with the process of getting "boots strapped", this idea gave the project its name BOOTSTRAP.
- The process to be developed was to be tested in practice and improved incrementally by means of these intensive tests. The participants in the project, all of which were software houses from Germany, Italy, and Belgium, as well as our first relevant client enterprise BOSCH in Stuttgart, declared their willingness to function as testing companies.

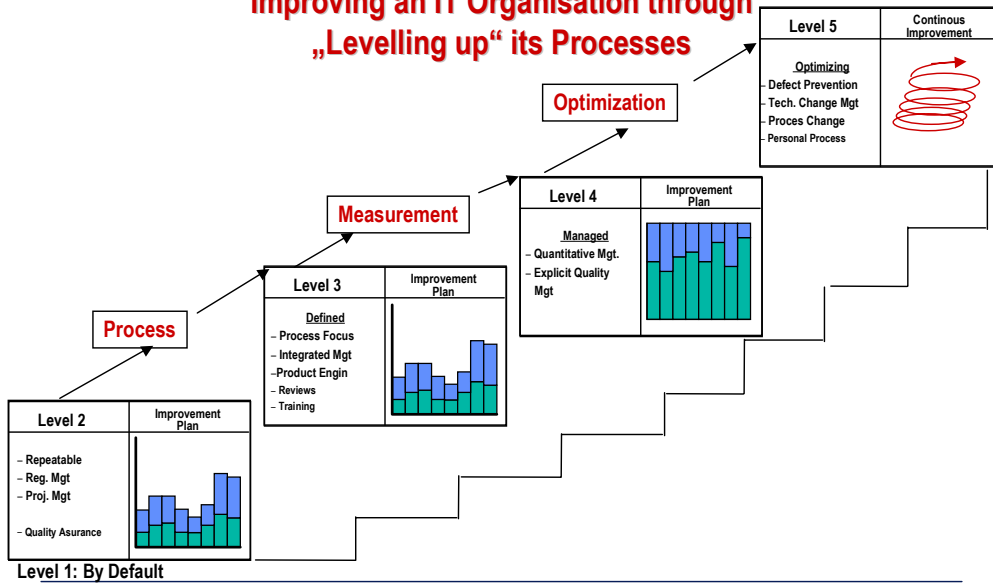
It was about one year later, at the turn of 1990/1991, when the project was launched, that the BOOTSTRAP project team first heard about the so-called CMM methodology of the American Software Engineering Institute (SEI). This methodology was claimed to facilitate the aim of improving the Software "process culture" by means of so-called process assessments.

The basic "philosophy of the CMM model" and of the improvements induced through its application is shown in the following four pictures:

## The Process As The Basic Element - for Modelling Organisational Flows - And The Underlying IT and Software-Processes



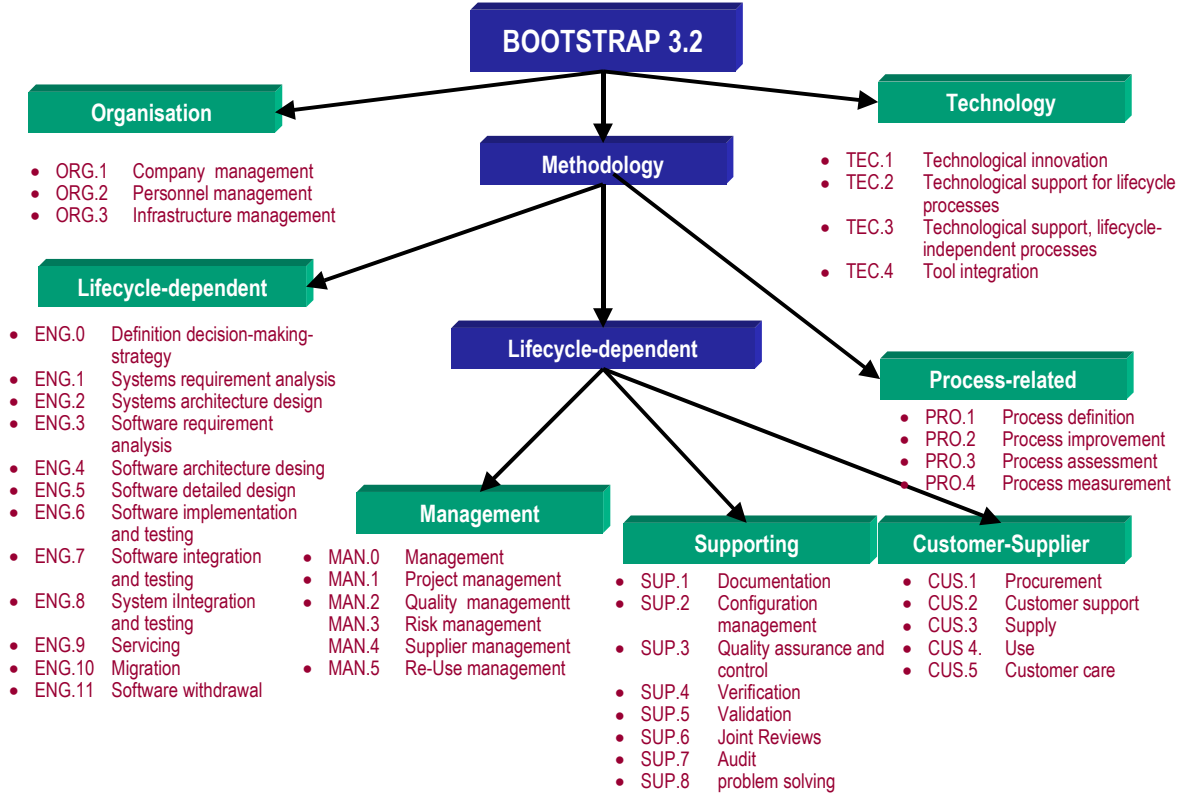
## Improving an IT Organisation through „Levelling up“ its Processes



Level	Process Characteristics	Predicted Performance
5 Optimizing	Process Improvement is institutionalized	
4 Managed	Product and processes are quantitatively controlled	
3 Defined	Software engineering and management processes defined and integrated	
2 Repeatable	Project mgmt. in place; performance is repeatable	
1 Initial	Process is informal and ad hoc; performance is unpredictable	

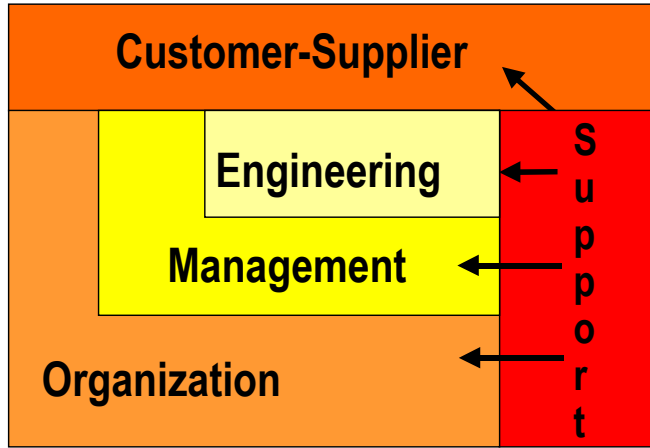
Our fundamental finding in the course of the BOOTSTRAP research project was that a level model of the entire software organisation alone cannot suffice and that rather at least a second dimension has to be taken into account – the aspect of organisational services and responsibilities in the organisational units for which the CMM assessment is to be valid. This led, in the beginning, to the definition of the so-called BOOTSTRAP attribute tree as follows.

### The BOOTSTRAP Attribute Tree: Including Organisational Aspects



This attribute tree formed the basis for a software process measurement and a methodology subsequent assessment procedure to determine the software process quality.

In the course of the further development of the BOOTSTRAP methodology, in 1994/1995, an ultimate process classification was set up by my colleague A. Dorling at the European Software Institute (ESI), which I had the honour to head at that time. This classification later became the ISO 15504 Standard ("SPICE"). It specifies in a far clearer and more modern way the categories of processes to be studied and improved:

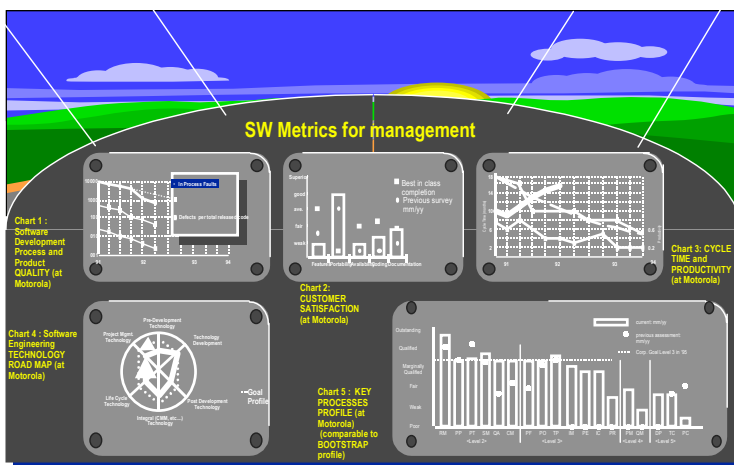


In those intellectually and politically productive years between 1993 and 1997, which marked the development of true and original European methodology for software process improvement by the BOOTSTRAP project and at the ESI, the American systems industry, in a parallel development, focused on the measurability of processes, such as Motorola, for instance, on the aspects as depicted in the following picture:

FORSCHUNGSZENTRUM SEIBERSDORF

## “Software Competitiveness Metrics/ Measurement”

Metrics & Measurements For Steering A Software Organisation:

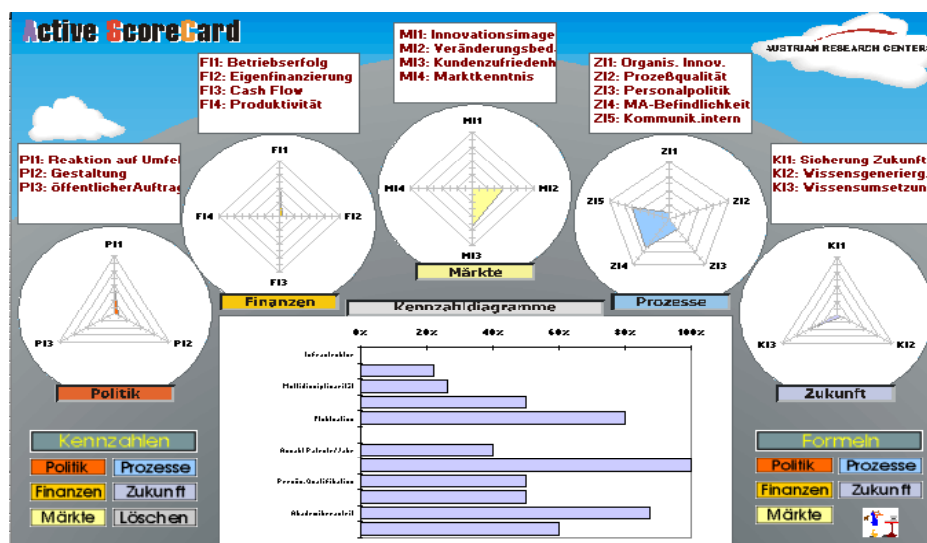


Source: MOTOROLA's 5'UP

These considerations that had been presented in the USA and, above all, at the SEI and which concerned the quantification and measurement of process qualities, encouraged me in 1999 – in my then position at the Austrian Research Centers (ARCS), which I had held since 1998 (and which I am still holding today) – to expand the so-called Balanced Scorecard Model and a related "organisational measurement method" developed at ARCS called "Active Scorecard" towards a method suited for a "thinking and research organisation" and to test it at ARCS. Our Cockpit rather helps to steer the company's strategies and not so much to control the specific production of software.

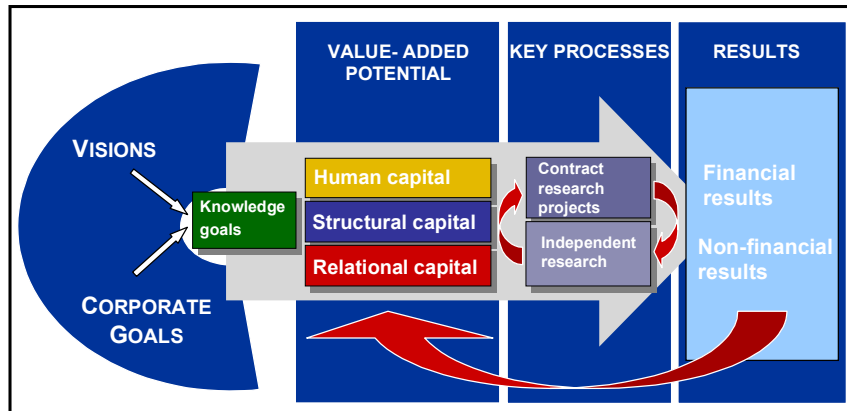


## The ARCS Active Score Card as a Tool for Executives at ARCS



However, this so-called "ARCS Active Scorecard Cockpit" and the related analysis and improvement processes represented merely an interim step in the direction of a comprehensive analysis and control model not only for the development of software, but for general services in "intellectual production". The "ARCS Intellectual Capital Report Model", which is also developing into a European standard, currently marks the preliminary conclusion of this development line. The "Austrian Research Centers" are the first research and development organisation in Europe to present and measure, in a model-like way, their potentials in knowledge management and knowledge production as a "production of intellectual goods" according to this model.

**The ARCS Intellectual Capital Report Model**

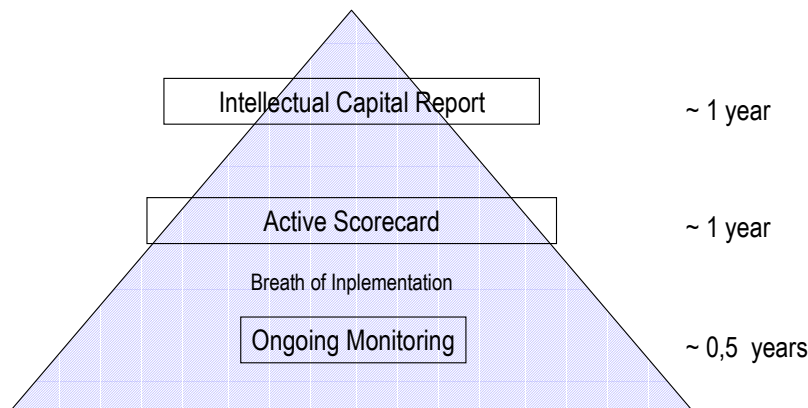


© Austrian Research Centers Seibersdorf, 2000



The relationship between the different levels of modelling and implementation from Vision/mission via strategies down to implementation and their respective control finally is shown by the following chart

**Hierarchy of Strategy down to implementative modelling, execution & control at ARCS**



Conclusion: One permanent feature can be observed like a red thread running from the BOOTSTRAP methodology invented in the year 1990, around 1995 the SPICE-procedure (ISO 15504), which had been developed at the European Software Institute, up to the Intellectual Capital Report of the year 2000: Ten years of successful conceptual work to increase competitiveness and generate new business for research organisations software houses, (quality) consultants, auditors, and above all for managers of knowledge enterprises who know that business successes cannot just be an issue of financial management, rather than the matter of intellect, motivation and productiveness of people