

Dashboard of Sustainable Development: Visual aggregation of the Swiss Sustainable Development Indicators System

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Abstract: The Swiss FSO uses a visual aggregation method called Dashboard to synthesise the information of its sustainable development indicators system containing more than 50 indicators. Indicators with various units can be aggregated by means of the evaluation of their trend. An overall view of the direction in which the selected indicators are progressing and access to each indicator is provided, thus achieving transparency. A conceptual framework in the background is indispensable.

1. Introduction

What is the best way to synthesise the information provided by an indicator system of more than 50 indicators? What is the best way to provide an overview that is easily understandable by the general public and by policymakers without losing transparency? This is the challenge faced by an indicator system such as MONET (German acronym for "Monitoring Sustainable Development").

There are several ways to aggregate data. Sustainable development requires complex communication not of a single indicator but of groups of indicators and even of the system as a whole. Two possible avenues are emerging: composite indicators and dashboards. At the FSO we have decided to pursue the second avenue. The approach used for MONET is a visual aggregation method called Dashboard (or Cockpit), in analogy with a car dashboard or aircraft cockpit. This simple method allows the aggregation of indicators with various units (by means of the assessment of their trend) and provides a synoptic view of a group of indicators (or of the whole system) as well as an overall assessment of the situation. At the same time, the Dashboard gives access to each individual indicator, thus allowing detailed information to be displayed and achieving transparency.

The aim of the paper is to describe the Dashboard of sustainable development and to provide information about the experiences made with it at the FSO.

2. Preliminary considerations before developing the Dashboard

The Swiss Sustainable Development Indicator System (MONET) comprises 75 indicators. How can we visualize them taking into account the complexity of the concept of sustainable development and the fact that not a single indicator but groups of indicators have to be communicated?

2.1 Need for a solid conceptual framework

In order to develop a non-arbitrary and transparent Dashboard in regard to the indicator selection and consequently also in regard to the given message, it is necessary to build it upon an indicator system with a conceptual framework. The conceptual framework of the Swiss MONET-System is based on a frame of reference, on a systemic structure, on selection criteria and on participative indicator selection methods.

The *frame of reference* is based on the original definition of sustainable development set forth in the Brundtland Report drawn on human rights principles and the theory of justice propounded by John Rawls in 1978. The definition of sustainable development is then broken down into three primary objectives: ‘Social Solidarity’, ‘Economic Efficiency’ and ‘Environmental Responsibility’ that are put in concrete terms by a set of forty-five sustainable development postulates [1]. Each of the forty-five postulates is linked to one of the three primary objectives. Every indicator is linked to at least one postulate. The trends of the indicators are evaluated based on the postulates (see 2.2 *Evaluation of the indicators*).

The *systemic structure* is a logical and systematic framework from which indicators can be chosen. In the case of MONET, this structure takes the form of a dual matrix comprising a thematic and a procedural axis:

- The thematic, or topic axis essentially determines what will be measured. This axis is broken down according to twelve themes, which are the gateway to the system and are similar to the eleven key challenges of the Federal Council’s Strategy for Sustainable Development [2] and to the European Union’s sustainable development indicators system [3].

- The procedural axis is based on the indicator classification [1] developed for the MONET project to describe the dynamics of the operations of relevance to sustainable development. The model encompasses: the degree to which social needs are met (indicator type: level L), flows to, or from, the capital for that purpose (indicator type: input/output Δ), the status and potential of resources (indicator type: capital C) and the level of efficiency of the flows to, and from, the capital, as well as disparities in the meeting of needs or in the access to stocks of capital (indicator type: structural criteria S). Combining different types of indicators allows complex statements to be made on particular topics and prevents arbitrary assessment of developments. All five sustainable development processes are based on the Brundtland definition and our interpretation of this definition.

2.2 *Evaluation of the indicators*

The aim of the evaluation of the indicators is to synthesise the message of the indicator. As sustainable development is a process and not a state and as the postulates give the direction to be pursued and not an absolute target, the indicators are evaluated based on their long-term trend and not on their last absolute value of the time series. Every indicator is linked to at least one postulate (see above “*frame of reference*”). The trends (and not the state) of the indicators are evaluated based on the postulates. The qualitative assessment of the evolution is made for the whole time series since 1987 (or later if data is not available from 1987). Always the whole time series is considered; yearly fluctuations are consequently not taken into account. The evaluation of each indicator is communicated by traffic light symbols (green/positive: moving towards sustainability, red/negative: moving away from sustainability, yellow/neutral: irregular or no significant change).

The FSO initiated and coordinates the “Expert Group on Indicator-based assessment” with the participation of EU-countries and EUROSTAT. The overall objective of the Group is to foster developments in indicator-based evaluation, e.g. trend versus state evaluation or combinations of both evaluations are discussed.

2.3 *Aims of the aggregation in a Dashboard*

The Dashboard should allow a global evaluation of the trends of the single indicators in regard to a sustainable development. The aim is to give a general overview of the whole system and at the same time to remain transparent, i.e. to “show the forest and the trees”. The

system should allow access to each indicator and show how it contributes to the result of the aggregation. Or, in analogy with a cockpit: the user should have access to what lies behind the cockpit, the wires, the engines, etc.

2.4 Preliminary study

A preliminary study on visualising the MONET indicator system led to the following conclusions:

- The trend evaluation (see 2.1 *Need for a conceptual framework*) of the indicators (positive, negative, neutral) is the key for aggregation. The evaluation of all indicators is comparable (same “measuring unit”) and no weighting choices have to be made.
- Structural elements are necessary, i.e. elements from the indicator system in the background (see 2.1) or from, for example, a sustainable development strategy.
- The number of indicators in one structural element should be the same in order to avoid a wrong impression of the importance of the structural element.
- The choice of the indicators should be systematic in order to avoid an arbitrary image of the overall situation.

3. The structure of the Dashboard

Following an international conference organised in 2005 in Neuchâtel [4], the FSO published a first Dashboard in 2007. This internet tool presented an overall image of sustainable development. It was structured into a systematic selection of the main postulates of sustainable development and the relating indicators. The postulates are the frame of reference of the MONET system [1].

The revised version of the Dashboard was adjusted to meet the needs of the Federal Council's Sustainable Development Strategy [2]. It is structured into the 11 key challenges of the strategy. The strategy is monitored by some of the MONET indicators: each of the 11 key challenges is headed by 5 MONET indicators that illustrate the progress. The 5 indicators from the MONET system were systematically attributed to the corresponding key challenge. The strategy is built upon a vision of sustainable development that includes the preservation of resources, intra-generational equity and equity with southern hemisphere countries, as well as decoupling. Since these elements correspond to the Capital and Structural Criteria types of

the systemic framework of the MONET system, the selection of the Strategy indicators was based on this systemic structure (see 2.1 Need for a conceptual framework).

The Dashboard of the Strategy [5] presents an overall image of the 11 challenges as well as the possibility of consulting each challenge or indicator separately. These elements are described subsequently.

3.1 The home page

The three primary objectives of “Social Solidarity”, “Economic Efficiency” and “Environmental Responsibility” are shown on the home page (see fig. 1). On the right side, the 11 key challenges are visible. When the cursor is dragged over the key challenges, the indicators of the respective key challenge appear in the corresponding primary objective (see fig. 2)

Fig. 1: The home page

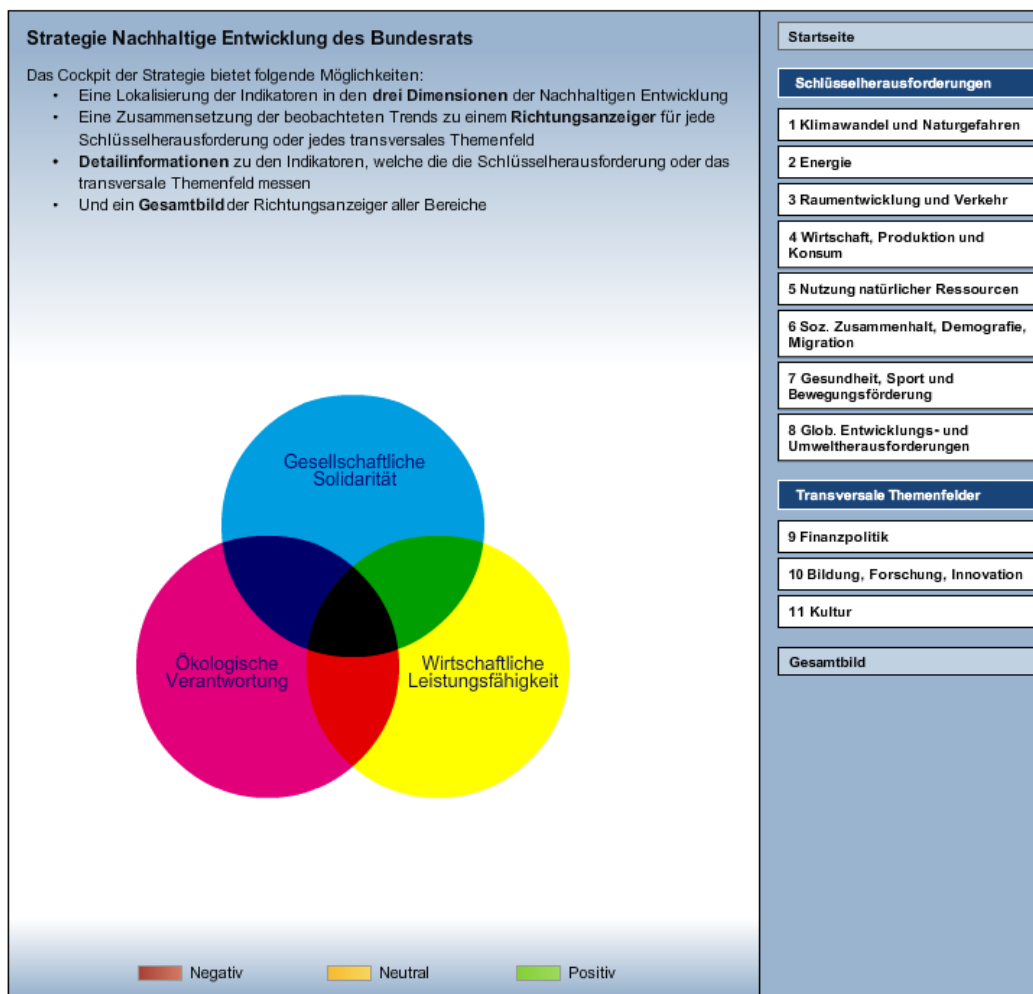
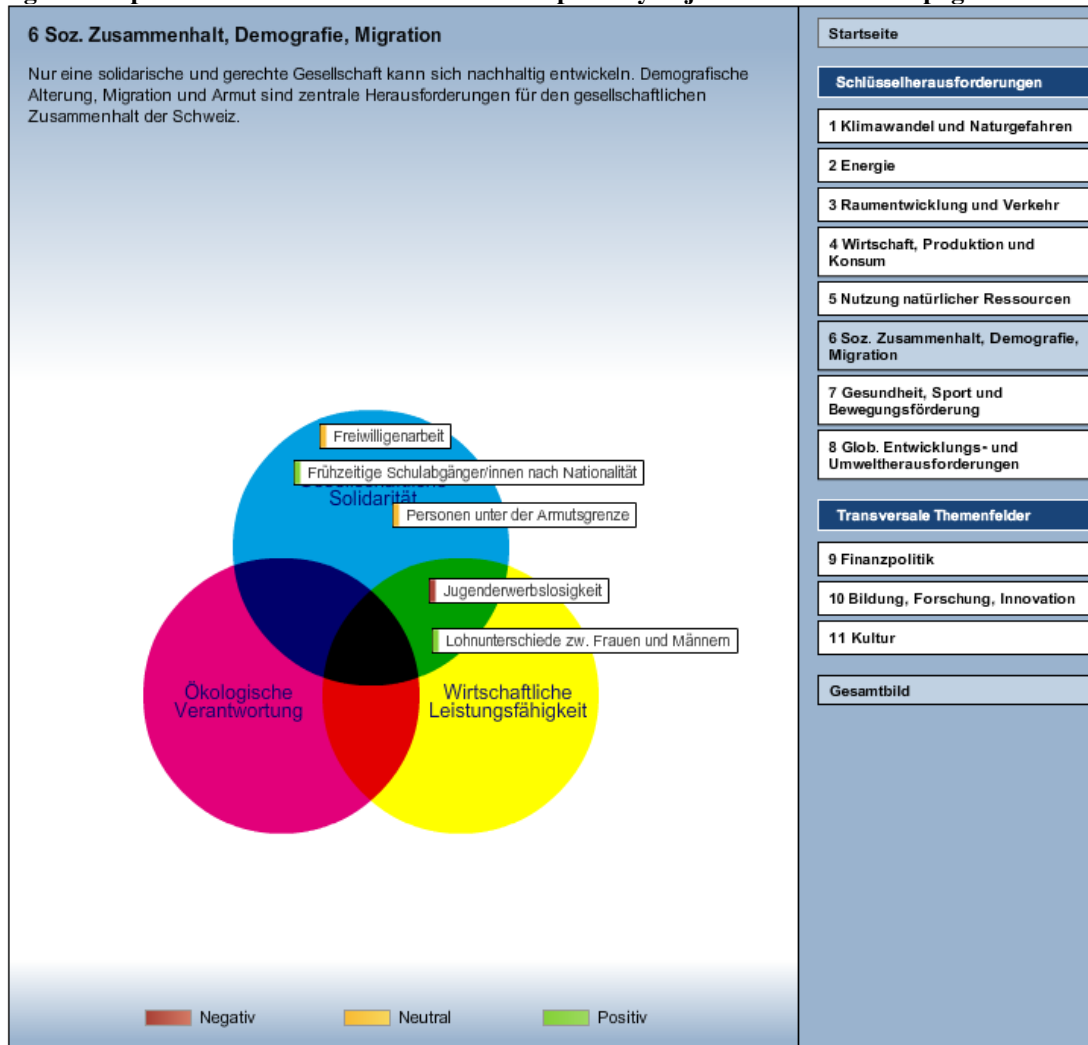


Fig. 2: The position of the indicators in the three primary objectives on the home page



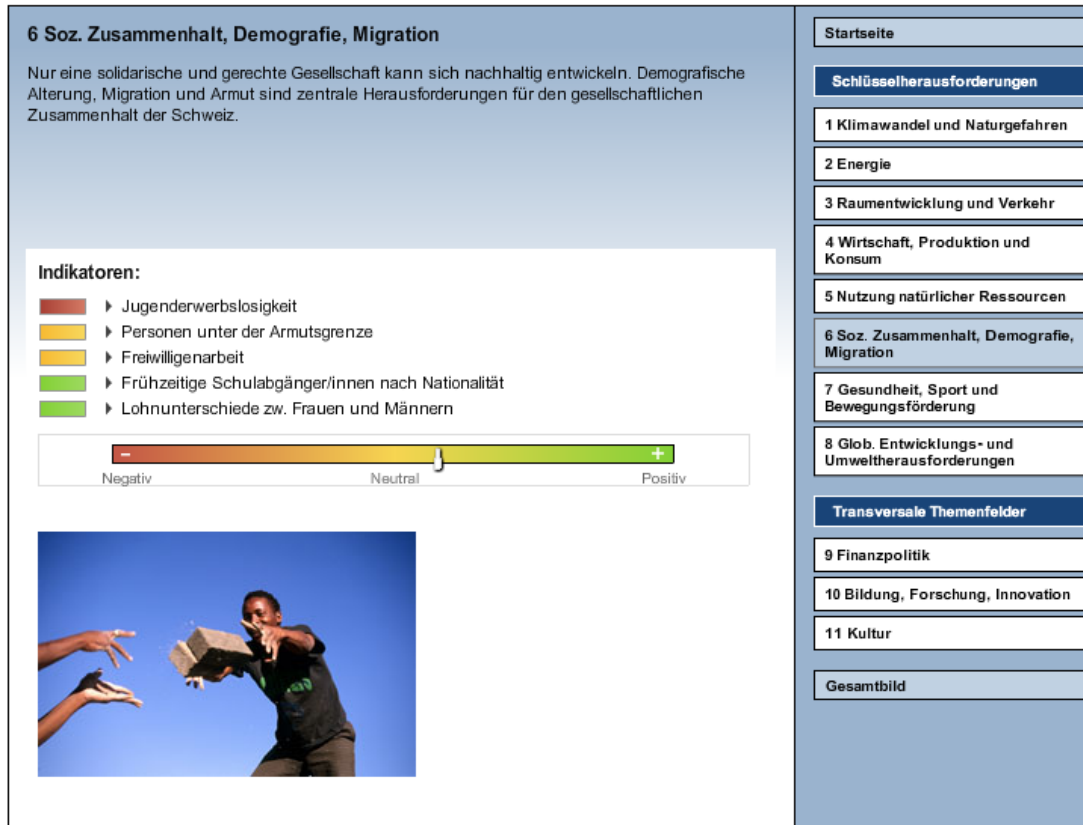
Thus, on the home page the following information is available: which indicators are part of the key challenge and how they are located in the three primary objectives of sustainable development. The colour on the left side of the indicator label already shows the trend evaluation of the indicator.

3.2 The single pages

Each key challenge can be viewed separately. 5 indicators (or fewer if data are still lacking) measure the progress of a key challenge. The trend of each indicator is evaluated. This evaluation is given by the MONET indicators system (see 2.2 *Evaluation of the indicators*). The Dashboard also uses the traffic light colours to communicate the evaluation of the indicators. Red indicates movement away from sustainability, green movement towards sustainability and yellow means neutral (i.e. irregular or no significant change). To get the summarised trend evaluation of a key challenge (i.e. the position of the pointer on the scale from red to green), the following sum is made implying the evaluation of the five indicators:

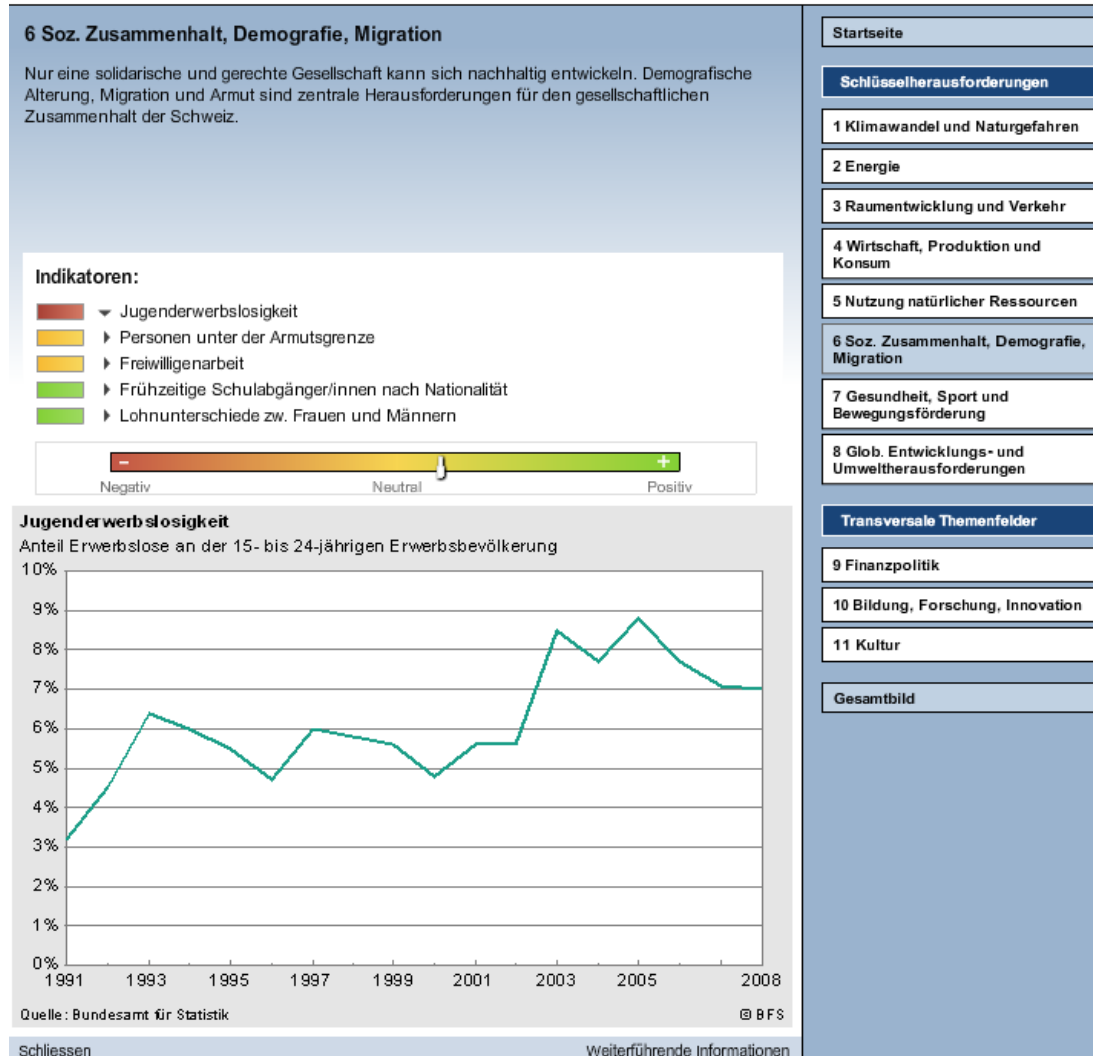
A positive evaluation is +1, a negative -1 and a neutral evaluation 0. The red-to-green-scale can therefore reach from -5 (red) to +5 (green). The five parameters (one per indicator) are aggregated and result in the evaluation of a key challenge. The summarisation-process is shown dynamically with a moving white pointer (see fig. 3).

Fig. 3: The single pages



The chart of each indicator can be displayed by clicking on the labels of the indicators (see fig. 4). The curve on the chart illustrates the trend evaluation. It is possible to get further information by clicking on „Weitere Informationen“ on the bottom of the chart. This link leads to the MONET indicators system where information such as the meaning of the indicator, methodological background information about the data or an Excel file with the data is provided.

Fig. 4: The single pages – chart and further information



3.3 The overview page

The overall evaluation of the indicators measuring the Sustainable Development Strategy (see fig. 5) is shown by the 11 red-to-green-scales (also shown separately on the single pages). They show an overall picture (the result of all 11 key challenges at a glance, i.e. the synoptic picture of all strategy indicators) but also the evaluation for each key challenge.

Fig. 5: The overview page – showing the trend evaluations: in which direction are we going?



4. Strengths and challenges of the Dashboard

The Dashboard is an attractive introduction to sustainable development monitoring because of its interactivity and intuitional use. It is a pragmatic instrument to show in which direction the 11 key challenges of the Sustainable Development Strategy are progressing.

This Dashboard gives an overview of the situation but also shows how this result is composed and provides access to the single indicators and background information. Both are accessible: a synthesised picture and the detail information. This ensures transparency and traceability.

The simple structure of the Dashboard also supports these arguments. However, the choice of the structure is pragmatic, in this case based on the 11 key challenges of the Sustainable Development Strategy.

The aggregation method is simple and transparent (interactively moving pointer). The selection of the single indicators that compose the overall picture is not arbitrary but based on an indicator system (MONET) with a methodological background (see 2.1. *Need for a conceptual framework*) and, relying on that, on the indicator selection procedure for the Sustainable Development Strategy. Transparency and non-arbitrariness is supported.

However, the question of arbitrariness concerning the weighting of the single indicators is not completely solved as it is also arbitrary to decide that all indicators have the same weight. It is as arbitrary as to assign different weightings to the indicators. However, it is easier to communicate the equal weighting of all indicators. The aggregation in this case is not without controversy but it is correct and understandable for the users.

On the overview page (fig. 5), it is not evident how the result is composed. Are all five indicators of the key challenge neutral? Or 2 negative, 2 positive and 1 neutral? However, this question can be answered on the single pages. There it can be transparently seen whether a neutral evaluation is really a stagnation or a composition of negative and positive trends.

Concerning the comprehensibility of the Dashboard it is not evident for all users that the evaluation is a trend evaluation (in which direction are we going?) and not a state evaluation (how is the situation?). We made the experience that a lot of users intuitively assume that red, green, yellow make a statement about a state or an absolute value if they did not read the information on the home page of the Dashboard. The FSO is actually working on its evaluation method of sustainable development indicators. Options to e.g. combine trend and state evaluations are being examined. The “Expert Group on Indicator-based assessment” mentioned in chapter 2.2 is also further developing the evaluation methods.

The Dashboard is a first essay of a visual aggregation. A complex situation as sustainable development is displayed in an attractive, interactive and clear way without losing the detailed information on which it is based. It contributes to overcoming the gap between scepticism towards composite indicators and the growing need for summarized answers to complex questions.

5. References

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[2] Swiss Federal Council (2008), Sustainable Development Strategy: Guidelines and Action Plan 2008–2011, Bern.

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[4] International Conference on "Visualising and Presenting Indicator Systems", Federal Statistical Office, Neuchâtel:

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<http://www.bfs.admin.ch/bfs/portal/de/index/themen/21/02/dashboard/02.html> (in German and French)