STATISTICAL STORY TELLING

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Summary

Statistics Netherlands has decided to pay more attention to statistical story-telling. This policy has been prompted by the reactions, and sometimes criticism, of users of statistics in the context of the recent financial crisis. The main problem turned out not to be the number of indicators, and not even the timeliness of the indicators, but rather the story behind the numbers: the analysis, trends and conclusions that can be drawn from them. The main challenge is to put together relevant indicators in a coherent framework. New IT tools have opened a broad range of possibilities to present such coherent indicator sets in (mostly interactive) visualisations, resulting in a number of new statistical products. This paper describes the construction process of these indicator sets, while the second part illustrates a number of new products and their uses.

(Parts of this paper have been taken from previously published papers by Floris van Ruth and Symon Algera , see references)

(1) Introduction

Statistics can be structured in many ways. Economic statistics can roughly be divided into National Accounts and short-term indicators.
National Accounts in turn consist of annual accounts and quarterly accounts. The main features of these accounts are “total coverage” and “full integration”: the National Accounts provide a comprehensive description of the whole economy and are fully integrated. But they suffer from the drawback that they are too slow for a quick description of the business cycle, as they are available only on a quarterly basis.
Short-term indicators, on the other hand, are not too slow for this purpose. Their timeliness is sufficient, but they have the disadvantage that they do not provide a total comprehensive description and that they are not fully integrated. These are inherent characteristics of short-term indicators.
The advantages of the National Accounts are the disadvantages of the short term indicators and vice versa. This presents a problem for the accurate and timely description and monitoring of business cycle developments, a problem that manifested itself in the recent economic crisis. The quarterly accounts were too slow, and the short-term indicators were too fragmented.

So how can we solve this dilemma? Statistics Netherlands has opted for two tracks: “Statistical story telling with coherent indicator sets” and “Extension towards more monthly macro-economic indicators”.

This paper describes “Statistical storytelling with coherent indicator sets”. But before elaborating on this, it provides some information about the other track.

Statistics Netherlands has recently started to publish monthly indicators for stocks of manufactured goods and private sector investment. These indicators complete the picture of monthly macro-economic indicators: indicators for household consumption and imports and exports were already published monthly. These indicators are all volume indicators (i.e. adjusted for price developments), and they have the same definitions as those in the quarterly accounts. The research on a monthly indicator for economic growth is in an advanced stage and looks very promising.

Now, back to the subject of this paper: statistical story telling. Statistics Netherlands’s aims to pay more attention to statistical story-telling instead of producing large databases filled with numbers.
Section (2) explains and describes the coherent indicator sets and visualisations, section (3) illustrates this with concrete products, and paragraph (4) contains some conclusions.

(2) **Coherent indicator sets**

Position of coherent indicator sets in the system of statistics

Combining statistics adds value to an individual indicator as it results in more reliable interpretations and shows its broader relevance. This approach can be described as statistical storytelling. In essence it selects and structures statistical information, thus making connections visible and yielding a comprehensive picture of the central theme.

This approach also ties in with the need for quick and reliable information to monitor the recent crisis, and which can signal future crises at an earlier stage. Many users consider the quarterly accounts to be too slow for this purpose. On the other hand, the various monthly indicators are considered to be too fragmented. It is often unclear which monthly indicators should be monitored, and what the overall situation is. In order to monitor the crisis, Statistics Netherlands has developed coherent indicator sets, which combine the timeliness of the monthly indicators with the summarising properties of the quarterly accounts. These products are published in the Business Cycle Fact Sheet. Coherent indicator sets are a new element of the statistical work programme.

Although it is not fully integrated, the Fact Sheet and its components provide a first insight into the development of variables in the integrated statistics. Structuring indicator sets, the intermediate stage of integration, is a way to achieve some of the advantages of National Accounts style integration, but with greater flexibility and timeliness.
It should be stressed here that the coherent indicator sets, at least those developed by Statistics Netherlands, do not aim to model or predict the associated phenomena. They are meant solely as a tool for monitoring and analysis. The indicators are not selected based on their leading character or forecasting power. Therefore, they are not built for early warning. But, and this is an important but, they do show which factors are potentially relevant for the development of key economic quantities. If we know which indicators influence realisations, and how economic variables are connected to general economic conditions, then future realisations and developments should come as less of a surprise.

In line with objectives and mission of Statistics Netherlands

A main aim for Statistics Netherlands is to present coherent information. The coherent indicator sets, which describe specific phenomena with various variables, fulfil this aim very well. The production and supply of statistics in the Netherlands is highly centralised at Statistics Netherlands. Unlike many other countries, Statistics Netherlands also conducts tendency surveys among businesses and consumers. These statistics are playing an increasingly important role in the description of business cycle developments. As a consequence, they have a crucial role in the coherent indicator sets. The centralised production of statistics in the Netherlands offers many opportunities to develop innovative statistical products. And in doing so, emphasis is placed on coherence in statistics. This also makes it possible to expand Statistics Netherlands' output, without adding to the response burden, and to make better use of existing data sources. Thus, the main benefit is that the usefulness of statistical information for large groups of users is enhanced, at little additional cost.

Supply driven

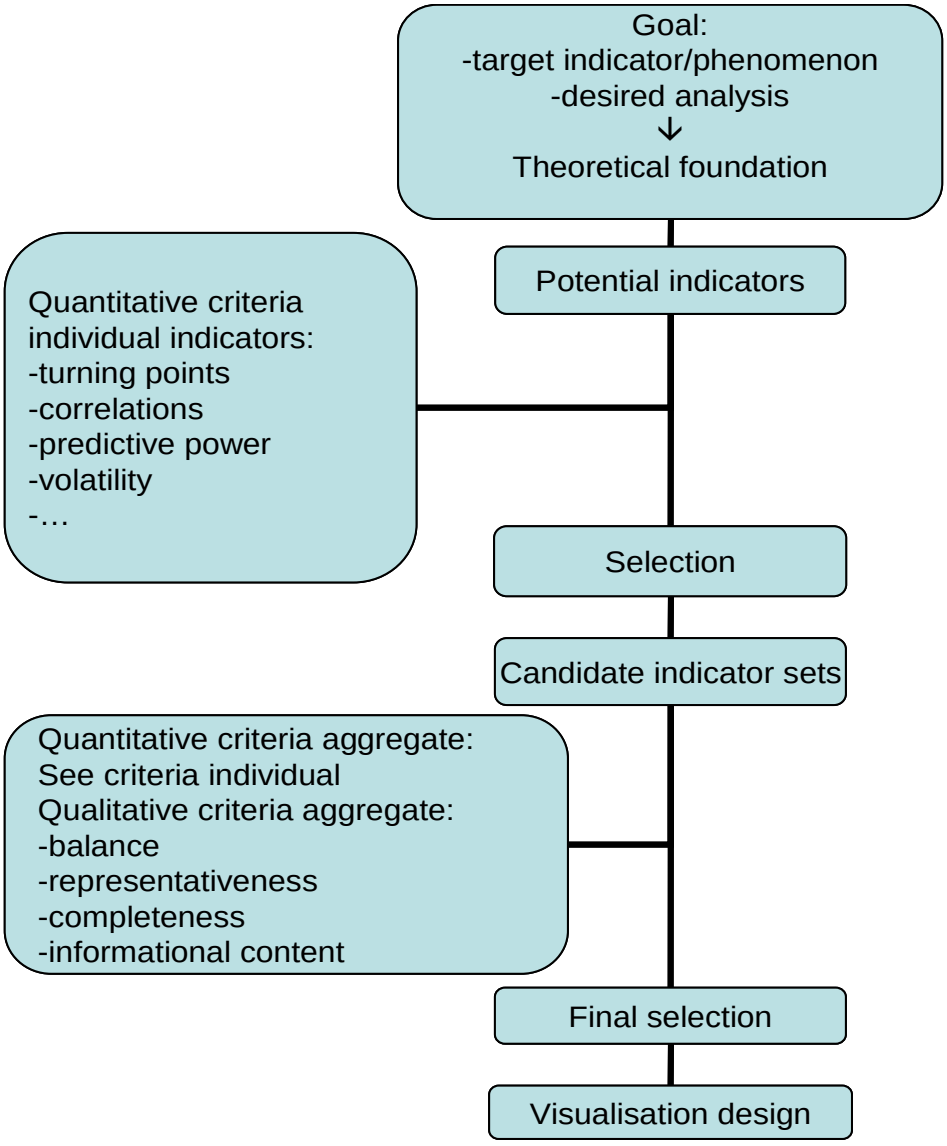
Experience at Statistics Netherlands has taught us that a supply driven approach for the development of these kinds of innovative products has many advantages over a demand driven approach. It is not wise to consult potential users too early in the innovation process. With only more or less abstract ideas and as yet no concrete products, it was difficult for them to imagine what the (finished) product would be like. Very generally speaking, most users ask for "more of the same". It even appears unwise to select and appoint target groups for the new products early on. It is important to work from an own vision about the statistical system and from own strength and own knowledge with respect to statistical opportunities, and then to wait and see for whom new products are useful.

An example of this is the development of the Business Cycle Tracer in the Netherlands. It was very difficult to convince potential users of all the possibilities of this product when we could only describe it in words. As soon as we were able to show a working prototype this changed radically. Moreover, the Business Cycle Tracer was originally developed for the media and especially for TV. In the end, schools turned out to be one of the most important users. We were very surprised by this. Every year in recent years, one question in the central economics paper (secondary school final exams) concerns Statistics Netherlands Business Cycle Tracer. As a consequence, the Business Cycle Tracer is part of the regular teaching material in secondary schools. This is very important for Statistics Netherlands, as today's students are tomorrow's users and suppliers of statistics.
Although it is unwise to consult potential users too early in the innovation process, it can be useful to present the concrete finished product to strategic partners and potential users. This may result in useful feedback, but it also builds credibility and support. It is more or less common practice at Statistics Netherlands to ask a wide variety of relations for feedback, which can result in important new insights.

Selection of indicators

The value and credibility of an indicator set depend critically on the selection of the indicators and the design of the monitoring tool.
At Statistics Netherlands, a general methodology has been developed for the construction of indicator sets. It is a chain of several steps, which act as a kind of sieve through which, based on a conceptual framework and ensuing conditions, potential indicators are selected or rejected. This can easily be represented in a flow-chart (see diagram below). However, this does not do justice to the paramount importance of the first step: deciding exactly what has to be monitored. Another way of formulating this is defining which questions the monitoring tool should answer. A clearly defined and well-thought-out concept will make the development process much smoother, and will therefore result in a much more focused and useful end product. The relevant considerations and criteria needed in the following steps of the selection and design process will also follow more naturally from a well-thought-out concept.
The next stage is using results from theory and empirics to establish which general factors determine or are connected to the selected phenomenon. The outcomes of this analysis will guide the next step, the selection of candidate indicators. This is actually the first step of the true selection process. The subsequent steps have a more quantitative character, as the potential indicators are benchmarked against the quantitative selection criteria. A list of well-performing indicators, which can be grouped into different candidate indicator sets, follows

from this. These indicators can be scored on aggregate performance according to the quantitative and qualitative criteria formulated in the beginning. This will most likely be an iterative process, as indicators are removed and added to achieve an optimal composition.



Designing the monitoring tool

The final stage of the development process is the design of the visualisation itself. This is an altogether separate process from the indicator selection. For a certain indicator set, a variety of visualisations will generally be possible, though some might be more suitable for the chosen aim than others.

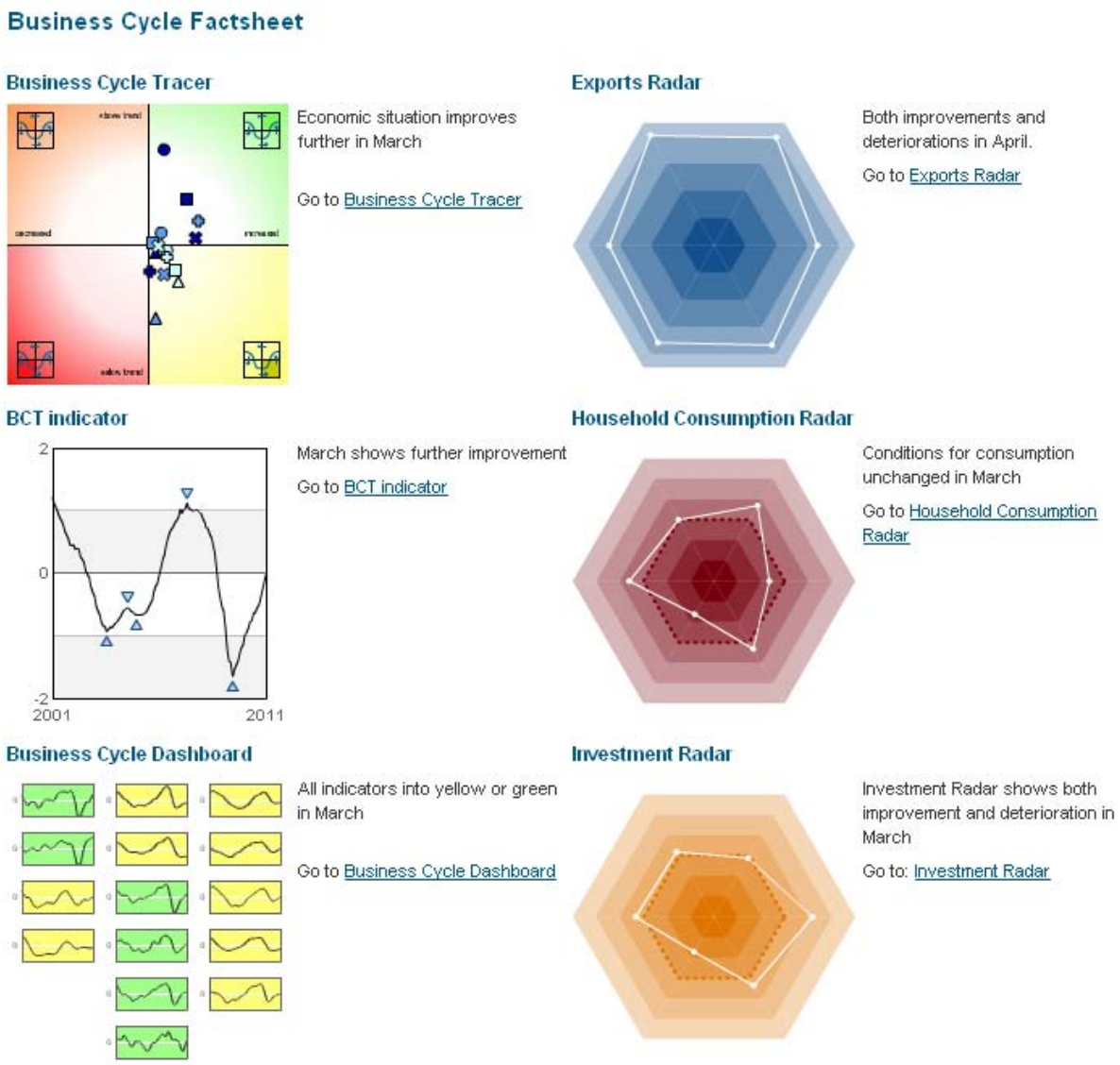
The coherent indicator set approach to reporting statistical information is greatly boosted by the possibilities offered by web-based applications. There is currently a shift in emphasis from

reporting numbers to offering alternative presentations and analytical tools. This has been made feasible by the possibilities the internet offers for constructing interactive and dynamic applications. These are two mutually reinforcing developments; coherent indicator sets give meaning to interactive applications, and the applications allow for new methods of presentation. Dynamic and interactive options allow users to explore the phenomenon and connections themselves. The power of visual representations should never be underestimated. For most users, these are much easier and faster to interpret than data in tabular form. And perhaps even more importantly, skilfully constructed visualisations can make the overall situation visible at a glance. These aspects probably also explain the great success of the interactive visualisation in schools.

However, fancy graphics alone will not make a tool useful, and a confusing concept or sloppy indicator selection will destroy its credibility. The development process is part science, part art. For the tool to be considered objective and reliable, the development process needs to be based as much as possible on theoretic and quantitative considerations. But to end up with a useful and comprehensible tool, a certain amount of judgement is inevitable. As far as the actual visualisation is concerned, certain aspects are generally desirable, such as a time function, user customisation options, clarity and use of colour codes. In general, however, each concept will lead to a different form of visualisation, which should be determined by the phenomenon concerned.

(3) B**usiness Cycle Fact Sheet**

The relevant coherent indicator sets are summarised into the Business Cycle Fact Sheet. This Fact Sheet provides a bird’s eye view of the current state of the Dutch economy.



Each indicator set is accompanied by short conclusions. These conclusions compare the situation with the past: the situation is “good or bad” and the preceding month, “better or worse”, terms that correspond with those defining the four stages of the business cycle. This interpretation is an important part of statistical story telling which is appreciated by users.

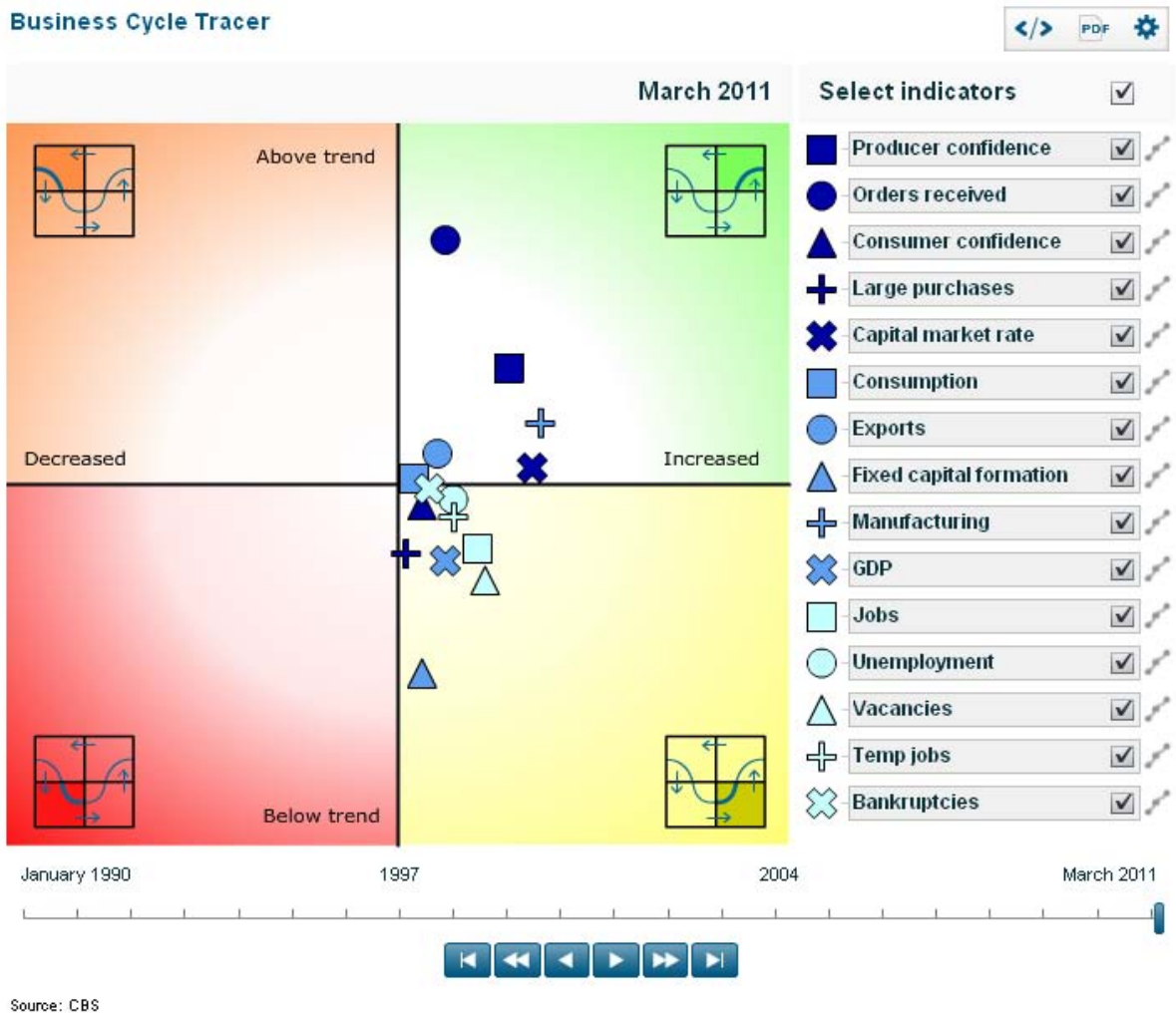
Users can click on the graph for a more detailed description and use of the indicators. In this way the visualisation can be approached and then be used interactively. A short description of each visualisation is given below, although without the interactive possibilities. Each product is accessible on our website, accompanied by a detailed technical explanation, and a simpler explanation for less experienced users. All explanations are available in Dutch and English.

Business Cycle Tracer

The Business Cycle Tracer is the central tool at Statistics Netherlands for analysing short and medium-term economic developments. It was constructed particularly to give a timely indication of the current state of the Dutch business cycle. The visualisation consists of a set of fifteen carefully selected and filtered macro-economic indicators, which are placed in a diagram according to their medium-term development (above or below trend) and their short-

term development (increasing or decreasing). The diagram is in fact a graphical representation of the concept of the business cycle: each quadrant represents a distinct phase of the cycle. The location of the indicators in the diagram reflects their position in the cycle, and the whole reflects the current state of the Dutch business cycle. The dynamic properties of the tool allow the user to choose a point in the past, see the corresponding state of the Business Cycle Tracer and watch a replay of the evolution of the business cycle. This graphical representation and visual interpretation is often easier and quicker to understand than a table or even a textual analysis. At the same time, the structure of the diagram and the selected indicators transfer a lot of information concerning the business cycle process.

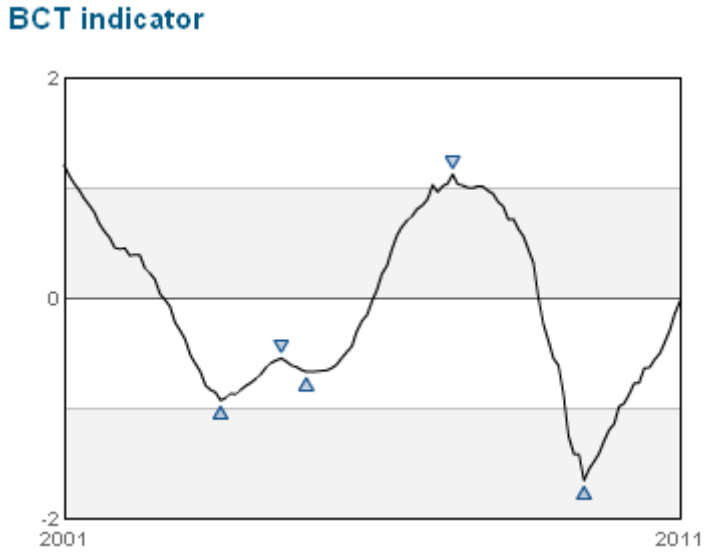
Here, the storytelling component comes into play. Not only does the composition of the Business Cycle Tracer show which indicators are important for analysing business cycle developments, it also shows that different economic indicators have different relationships with the business cycle.



Business cycle tracer indicator

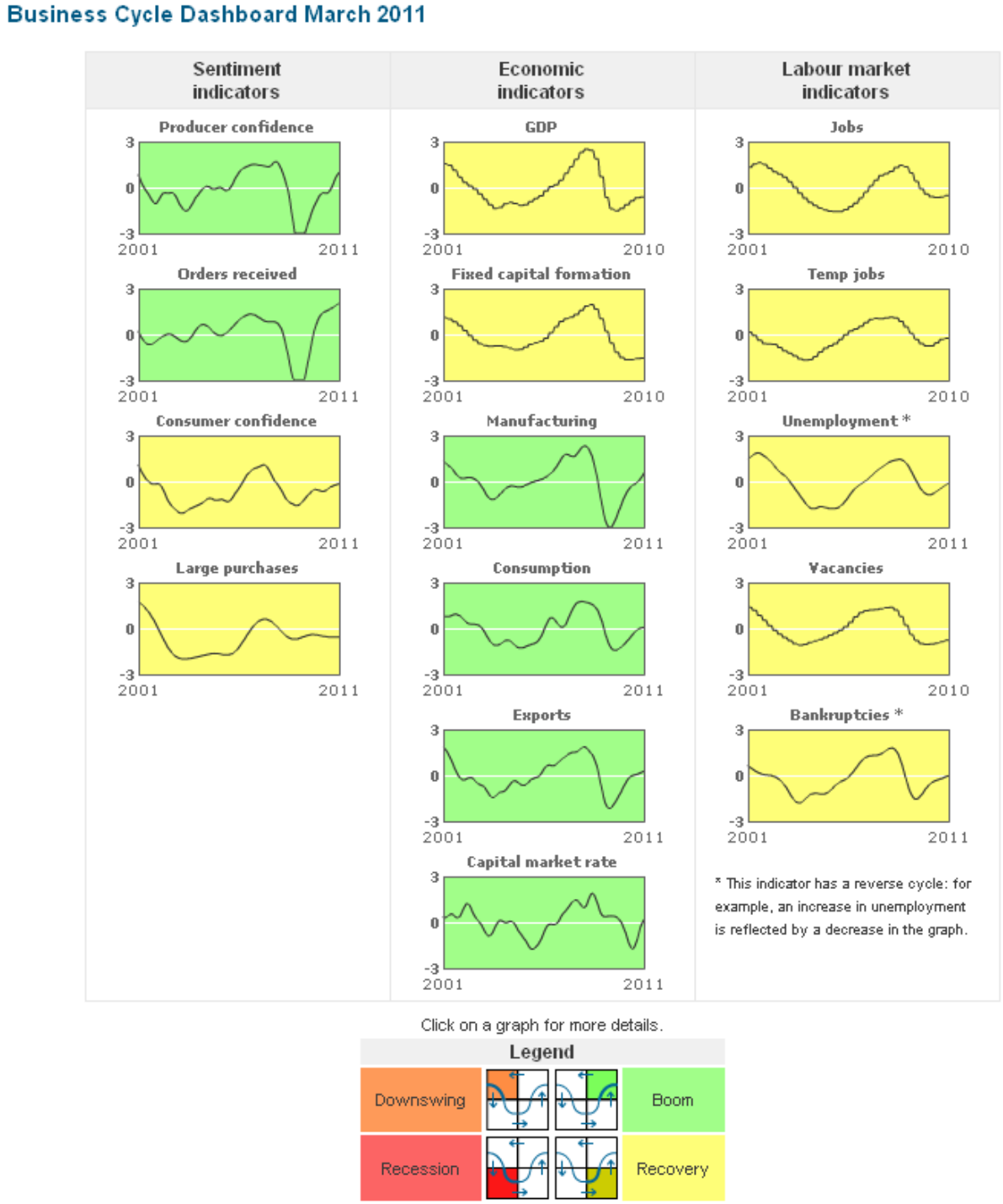
The Business Cycle Tracer Indicator is the simple average of the component indicators of the Business Cycle Tracer. It represents the Dutch business cycle, and is therefore a coincident composite indicator. Although visually not very exciting, these aggregate indicators can be very useful, as they are able to summarise the information present in potentially large and

diverse sets of indicators. The resulting composite indicators tend to be easier to interpret than a set of separate indicators, and they show the communality of the individual indicators. On the other hand, users should be warned of the (well-known, but not discussed here) disadvantages of composite indicators



Business cycle dashboard

The Business cycle dashboard shows the cycles of the individual indicators jointly and in a structured fashion. The indicators are divided into three groups: sentiment, economic and labour market indicators. A simple colour code, corresponding to the colours of the business cycle phase in the Business Cycle Tracer, characterises the phase of each individual indicator. The differences in development of different types of indicators become visible at a glance. The interactive element of the Business Cycle Tracer allows users to analyse the behaviour of individual indicators compared to the group as a whole and to other individual indicators. Thus, the existence of leading, coincident and lagging indicators is shown explicitly, as are connections among business cycle indicators themselves.

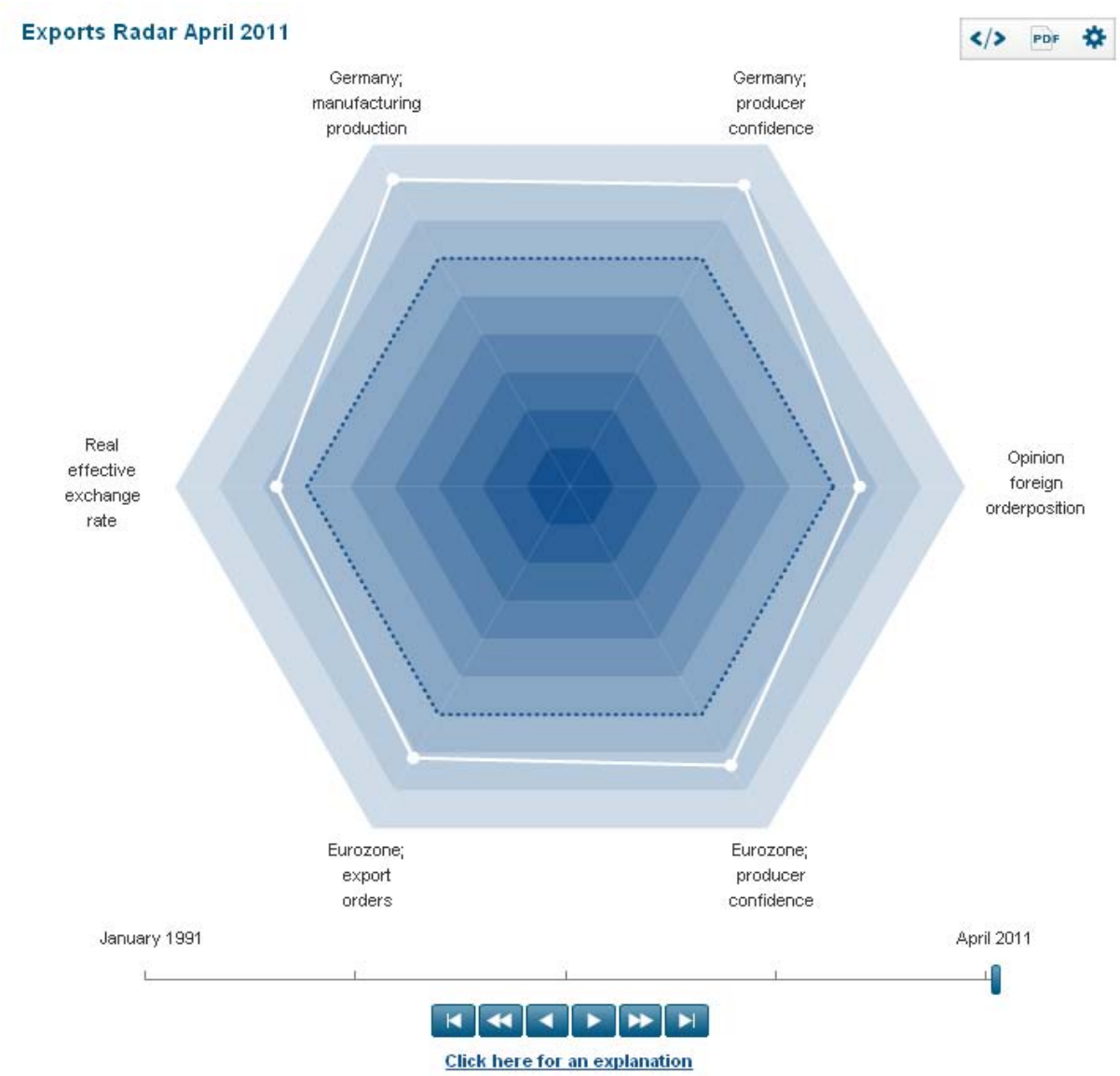


At a glance, the overall distribution of the individual indicators is visible, and also the resulting overall situation. The colours are a tool for characterising and communicating the development of the individual indicators.

Exports Radar

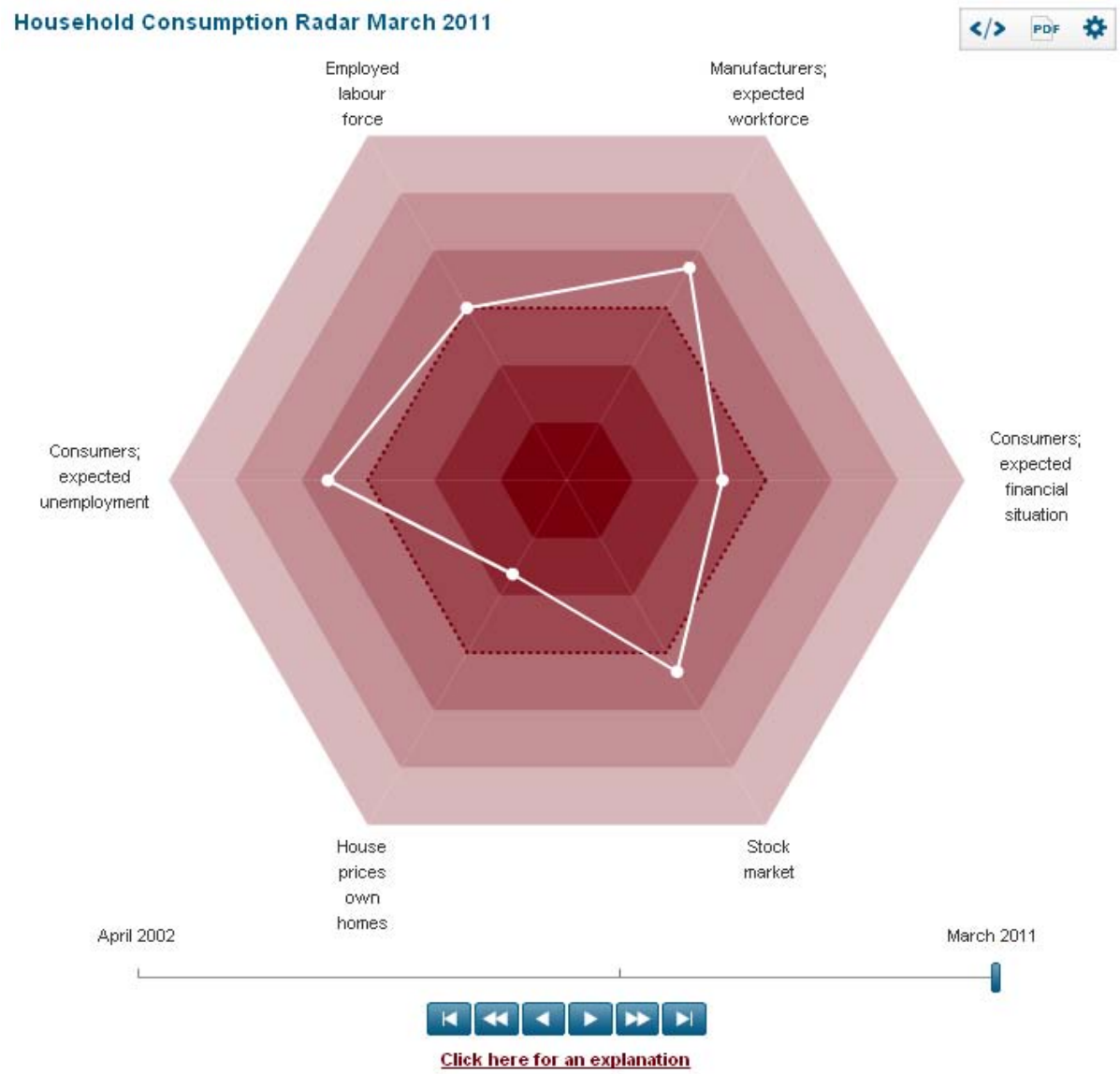
The Exports Radar is a visual tool for analysing export conditions. It consists of six economic indicators, all relevant for Dutch exports. Together, they show whether conditions are favourable or unfavourable for Dutch exports. Using the time function, it is also possible to

see whether conditions have improved or deteriorated compared to the previous month or any other previous period. Fundamental to this concept is the identification of factors which determine the development of the economic phenomenon to be tracked, in this case exports. For Dutch exports, the main factors are competitiveness and developments on the major exports markets: Germany and the rest of the eurozone. The next step is to select the most relevant indicators representing developments in these factors. The Exports Radar is an analytical tool. Its main function is to assist in analysing exports development. It places exports developments in context and helps to answer questions like "why have exports grown/decreased (this much)?" The graphic format makes interpretation easy and intuitive: a wider diagram means more favourable conditions. At the same time the Radar also has a strong statistical storytelling aspect: it shows how exports relate to other economic indicators, and which ones are the most relevant. Like the Business Cycle Tracer, the Exports Radar – and all the other Radar tools - have a number of interactive possibilities.



Household Consumption Radar

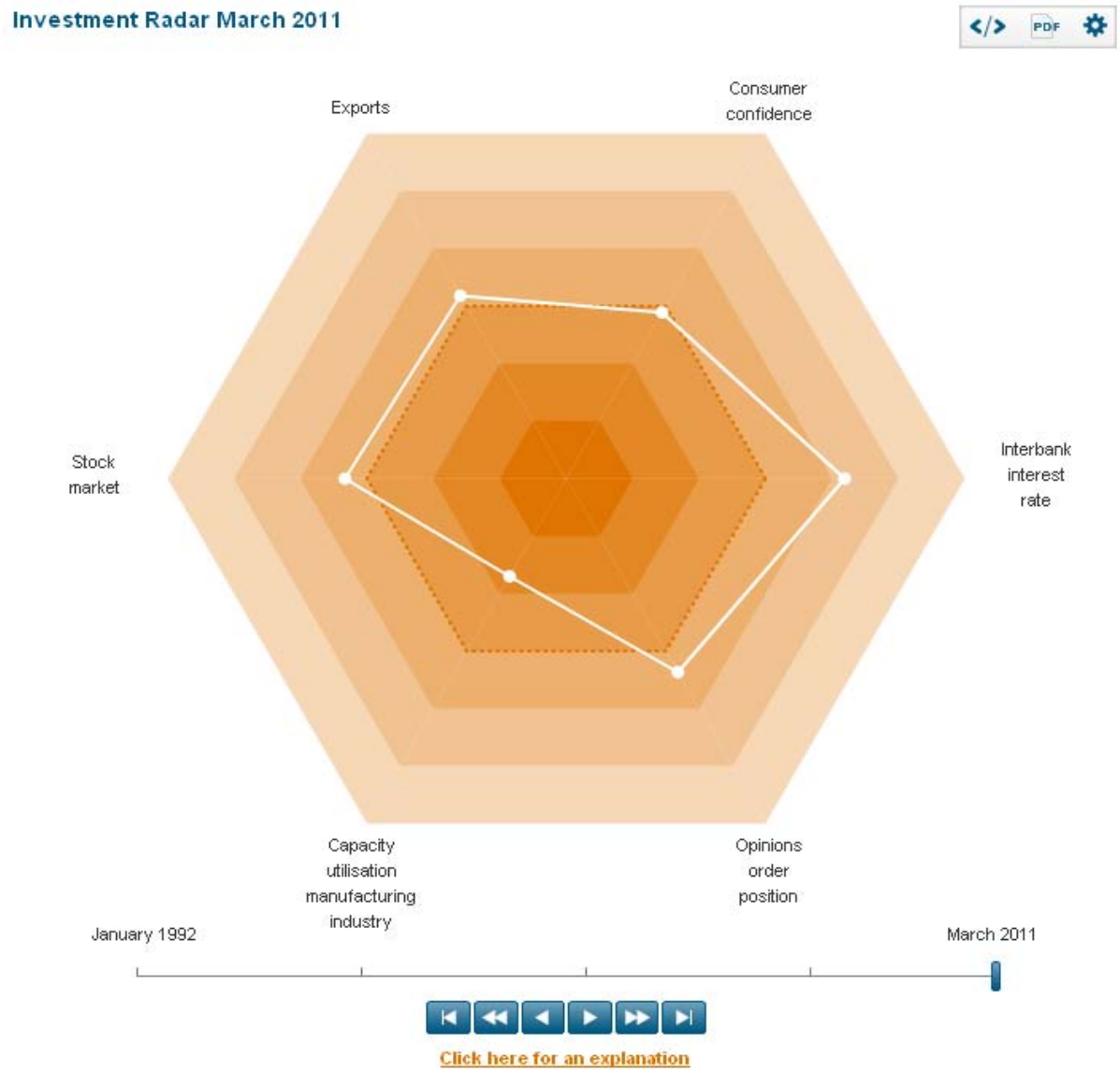
The Household Consumption Radar shows whether conditions are favourable or unfavourable for household consumption. The basic idea is the same as for the Exports Radar, although obviously the indicators are different. Household consumption is influenced by consumers' expectations, the situation on the labour market and developments in capital. The employed labour force and expectations of manufacturers regarding future employment represent the situation on the labour market. Consumers' expectations about unemployment and about their own financial situation also affect household consumption. Furthermore, developments of house prices and share prices reflect the development of consumer capital.



Investment Radar

The Investment Radar shows whether conditions are favourable or unfavourable for fixed capital formation. The selected indicators are based on the assumption that fixed capital formation is influenced by the need for investment on the one hand, and by the access to capital on the other. Exports, consumer confidence and manufacturers' opinions on their order books tell us something about sales and the potential market, whereas the capacity utilisation

rate shows which percentage of production capacity is used. The interest rate and the stock market are the financial components.



(4) Conclusions

This paper has aimed to show that coherent indicators sets and visualisations are powerful tools to extract the information present in statistical data, and make it widely available. Structuring statistical indicators is a way to add value to individual indicators and to meet the information needs of users better. Explicitly showing connections between economic indicators not only communicates important knowledge, but also means that new developments are less unexpected. Coherent indicator sets and the visual and interactive possibilities offered by the internet are mutually reinforcing phenomena. Without the interactive and visual possibilities, much of the information present in the indicator sets would remain hidden for most users. But I hope that I have also shown that without a well-thought-out concept and a rigorous development process, as described above, a visualisation will never reach its full potential.

Statistics Netherlands has committed to developing more coherent indicator sets and infographics like those described here. By doing so, it is placing emphasis on coherence in statistics, expanding its output without adding to the response burden and making better use of existing data sources. The main benefit of all this is that the usefulness of statistical information for large groups of users is enhanced, at little additional costs.

References

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