

An Eighth Application of ASPIRE for Statistics Sweden

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1. Executive Summary

In 2011, the Ministry of Finance directed Statistics Sweden to develop a system of quality indicators for a number of key statistical products. This system was to include metrics that reflect current data quality as well as capture any changes in quality that occur over time. With the help of external consultants, Statistics Sweden developed a quality evaluation approach that is referred to as ASPIRE: A System for Product Improvement Review and Evaluation. The review process was conducted annually from 2011 to 2017 for essentially the same core set of statistical products.

Following an internal evaluation of the ASPIRE approach in 2017, Statistics Sweden initiated a number of changes to ASPIRE in 2018. The objectives of these changes were principally to better align the approach to the Swedish quality framework for official statistics; review and renew the selection of products to be evaluated; and refresh the supply of experts providing evaluations and recommendations.

These changes cause a break in the time series regarding the annual results from the ASPIRE evaluations which are presented in Statistics Sweden's annual report to the Swedish government.

This report summarises the results from the eighth annual review of ASPIRE which was conducted in May 2019 by the ASPIRE team. The Round 8 report covers the following five products which were also reviewed in the previous round: Labour Force Survey (LFS), Consumer Price Index (CPI), Producer and Import Price Index (PPI), Statistical Business Register (SBR), and the GDP component of the quarterly National Accounts, (GDP-Q). These products will now be reviewed every two years.

In addition preliminary interviews were conducted with the following product areas, which will be reviewed next year: Environmental Accounts (Air Emissions), Building Statistics, and Production Value Index.

Section 2 of this report sets out the changes to ASPIRE in this round. The adoption of the new Swedish Quality Framework requires the accuracy of the statistics to be set in relation to the purpose of the statistics, such that statistics should be fit for purpose. The accuracy components used by ASPIRE are consistent with this. Guidelines and checklists which support the new rating process have been developed, and following our experience in Round 8, these will be reviewed and modified to improve their effectiveness for future rounds. The average score for the quality component, *Overall accuracy*, replaces the previously reported total score in Statistics Sweden's annual report to the government. This is judged to be the quality component of most importance and interest to Statistics Sweden's stakeholders.

The product reviews and associated scores are presented in section 3. There is a natural tendency to compare the overall scores across the products or to rank the products by their total score. However, the ASPIRE model was not developed to facilitate such inter-product comparisons and there are some risks associated with ranking products in this manner. Normally, a more appropriate use of the product scores is to compare scores for the same product across review rounds as a way of assessing progress toward improvements. However, on this occasion the changes to the ASPIRE process make comparisons with previous ASPIRE scores not very meaningful. Further discussion of this is in section 3.1. As a result, the most important use of the 2019 ASPIRE ratings is to provide a benchmark against which future ratings can be assessed.

In section 4 we set out some cross cutting issues and recommendations. These arose in the course of discussions with the various product teams. The development of the Swedish Quality Framework, based on *fitness for purpose*, gives an opportunity for some in depth discussion with major users to develop real understanding of key uses and the quality requirements of users, leading to benefits for both sides. Similarly, we would expect the strategic focus on the *citizen user* to result in improvements in the accessibility and clarity of quality reporting.

We were struck in some of our discussions by a lack of focus on the accuracy of short-term movements, a key requirement of economic statistics, and thought this would benefit from more emphasis, as would a stronger relationship with administrative data suppliers.

In Section 5 we have set out nine recommendations that we consider the highest priority for improving the statistical products of Statistics Sweden. They have been assessed based on impact and viability (including cost). They are:

1. Clarifying 'fitness for purpose' with key users.
2. Focusing more on measuring short-term movements of change.
3. Work to conclude the SBR re-engineering project, and on supporting the profiling of the largest business units.
4. Develop an implementation strategy for the new national accounts IT system which minimises the risk to their operations taking account of other activities such as the revision of benchmarks.
5. Developing a data processing platform for CPI scanner data.
6. Strengthening relationships with administrative data suppliers.
7. Developing alternative sources to the Household Budget Survey
8. Take a more strategic approach to tackling non-contact in the Labour Force Survey
9. Further work to improve the coverage of the PPI.

The changes to ASPIRE referred to in section 2 need to be in, and in section 6 we make some small suggestions for improvement based upon the experience of this round.

2. Changes to ASPIRE in Round 8

Following an internal evaluation of the ASPIRE approach which had run for seven rounds since 2011, Statistics Sweden initiated a number of changes to ASPIRE in 2018 (Statistics Sweden 2019b). The objectives of these changes were to:

- better align the approach to the Swedish quality framework for official statistics legislated in 2016-2017 (Statistics Sweden 2018), and Statistics Sweden's ongoing work with a quality framework for statistical registers (Statistics Sweden 2019a), thus strengthening the connection between ASPIRE and other quality initiatives at Statistics Sweden
- review and renew the selection of products to be evaluated in the coming years,
- improve the process for the products allowing more time for them to plan and implement the work with expert recommendations,
- secure and refresh the supply of experts in order to provide other perspectives for future evaluations and recommendations.

The changes will involve a break in the time series regarding the annual results from the ASPIRE evaluations which are presented in Statistics Sweden's annual report to the Swedish government. The changes involve several aspects which are further elaborated in The ASPIRE Operations Manual (Statistics Sweden 2019b) and summarised below.

- The accuracy of the statistics is set in relation to the purpose of the statistics such that statistics should be fit for purpose. This replaces the previous aim that was implicit in ASPIRE to achieve excellence by minimising errors considered to be of high inherent risk.
- The Accuracy components follow the Swedish quality concept for official statistics and the corresponding framework for statistical registers replacing the previous listings of error sources for statistical surveys, registers and national accounts.

Table 1. Sub and sub-subcomponents of Accuracy for statistics and registers

Sub and sub-subcomponents of Accuracy in statistics	Sub and sub-subcomponents of Accuracy in statistical registers
Overall accuracy	Overall accuracy
Sources of uncertainty:	Sources of uncertainty:
-Sampling	
-Frame coverage	-Coverage
-Measurement	-Measurement
-Non-response	-Non-response
-Data processing	-Processing
-Model assumptions	-Model assumptions
Preliminary statistics compared with final statistics	Preliminary register compared with the final register

- Single sources of uncertainty are assessed and categorised according to their importance to *Overall accuracy* according to low (L), medium (M), or high (H). This categorisation corresponds to a weighting scheme of 1, 2, and 3, to compute a weighted average score, *Sources of uncertainty*. This approach replaces the previous concept in ASPIRE of inherent and residual risk for error which determined the weight for each "error source" in the computation of the total score.
- The guidelines and checklists which support the rating process have been adapted to each of the subcomponents of Accuracy according to the Swedish quality framework. There are now three sets of guidelines and checklists – one for each of *Overall accuracy*, *Source of uncertainty*, and *Preliminary statistics compared to final statistics*.
- The average score for the quality component, *Overall accuracy*, replaces the previously reported total score in Statistics Sweden's annual report to the government. *Overall accuracy* is judged to be the

quality component of most importance and interest to Statistics Sweden's stakeholders. What is of most interest in the scoring is how fit for purpose the product is in relation to overall accuracy.

A number of changes were also made to the ASPIRE process aimed at improving the evaluation process for the products. These changes are also further elaborated in The ASPIRE Operations Manual (Statistics Sweden 2019b) and summarised below.

- Five of the ten previous products were phased out after the evaluation round in 2017 thereby providing room for new products. These products were phased out on the basis that the ASPIRE process had given sufficient stimulation to improvements and that other products could benefit more. The remaining five products will continue with ASPIRE on the basis that there is continued interest with both management and stakeholders to follow the developments of quality in these products, and that the products will continue to reap the benefits of the ASPIRE evaluations. These products were evaluated 2019 and the results are presented in this report. The products will continue to be evaluated every other year.
- Three new products (or groups of products) are selected to be evaluated in 2020 and thereafter every other year i.e. Environmental Accounts (Air Emissions), Building statistics and Production value index (PVI).
- The external review team has been replaced in 2018 with three new experts – Johanna Laiho-Kauranne, Susan Linacre and Stephen Penneck. Dennis Trewin provided valuable support to the new expert team during 2018-2019 for the new team's initial ASPIRE evaluation round in May 2019.

3. Product Reviews

3.1 General Observations

There is a natural tendency to compare the overall scores across the products or to rank the products by their total score. However, the ASPIRE model was not developed to facilitate such inter-product comparisons and there are some risks associated with ranking products in this manner. For one, the average score for the component, Sources of uncertainty for a product reflects a weighting of each single source of uncertainty by their importance to Overall accuracy, which can vary considerably across products. Products with many highly important sources of uncertainty may be at somewhat of a disadvantage in such comparisons because they must perform well in many important areas in order to achieve a high score.

Furthermore, the assessment of low, medium, or high importance to overall accuracy is done within a product, not across products. Thus, it is possible that a highly important source of uncertainty for one product could be of less importance to Statistics Sweden than a medium important source of uncertainty for another product if the latter product carries greater importance to Statistics Sweden or for official statistics. If resources devoted to accuracy improvements are greater for one product than another, this could also explain why some products are able to show greater improvements than others. Further, although we have attempted to achieve consistency in ratings among products, some inconsistencies surely remain.

Finally, the scores assigned to a particular source of uncertainty for a product have an unknown level of uncertainty due to some element of subjectivity in the assignment of ratings as well as other imperfections in the rating process. A difference of 2 or 3 points in the overall product scores may not be meaningful because a reassessment of the product by different reviewers could reasonably produce an overall score that differs from the assigned score by that margin. Thus, any ranking of products would need to acknowledge these inevitable and unknown uncertainties in the ratings.

Normally, a more appropriate use of the product scores is to compare scores for the same product across review rounds as a way of assessing progress toward improvements. However, on this occasion the Swedish quality framework has been more explicitly incorporated into the ASPIRE process resulting in a number of changes (see Section 2) making comparisons with previous ASPIRE scores not very meaningful. Furthermore, a new ASPIRE team has assigned the ratings which will differ from the previous team because of the subjective nature of ASPIRE.

One change to ASPIRE has been to weight the sources of uncertainty according to their relative importance to overall accuracy. Previously a total score was calculated based on the intrinsic risk. This change by itself will result in important discontinuities.

Another important change in ASPIRE was to place greater importance on fitness for purpose and knowledge of the users and uses of the statistical products. This had the biggest impact on the knowledge and communications criteria and tended to lower these scores.

As a result of these changes, the most important use of the 2019 ASPIRE ratings is to provide a benchmark against which future ratings can be assessed.

Table 2 shows the summary scores for the five products that were reviewed this round. It is important to note that the ratings and derived scores are for the product, not the producer, so also reflects the work of the different areas servicing the product.

Table 2 Summary of Average Scores by product

Product	Overall accuracy (average scores)	Sources of uncertainty (weighted average scores)
LFS	47	59
CPI	58	63
PPI	53	55
SBR	55	58
GDP-Q	55	55

The scores for Overall accuracy are generally lower than the scores for the sources of uncertainty, which is the average of the scores for each single source of uncertainty for a product weighted by the importance of these to Overall accuracy. This is not surprising. To obtain a high rating for Overall accuracy, there needs to be a strong understanding of the user requirements for accuracy and the influence of the sources of uncertainty on overall accuracy. You would expect a 'Total Survey Design' approach to determine the mitigation steps necessary to maintain adequate accuracy levels.

Table 3 shows the average scores per product for each component of Accuracy. The importance of the single sources of uncertainty to Overall accuracy - high, medium, low or not applicable – is indicated by the shaded cells. The average scores for each Accuracy component across the five products are shown in the second last column together with the weighted average scores in the last column. The weights of 3, 2, 1, and 0 correspond to the categorisation of high, medium, low or not applicable regarding the importance to Overall accuracy.

Table 3. Average scores by Accuracy component and product

Sub and sub-subcomponents of Accuracy for statistics/registers	LFS	CPI	PPI	SBR	GDP-Q	Average score	Weighted average score
Overall Accuracy	47	58	53	55	55	54	N/A
Sources of uncertainty:	59	63	55	58	55	58	N/A
-Sampling	60	67	55	N/A	42	56	59
-Frame coverage /Coverage	60	65	58	62	62	61	62
-Measurement	65	68	53	58	52	59	59
-Non-response	55	55	57	47	47	52	53
-Data processing/Processing	55	60	58	62	55	58	59
-Model assumptions	60	58	52	52	62	57	57
Preliminary statistics/register compared to final statistics/register	N/A	N/A	N/A	N/A	67	N/A	N/A

Importance to Overall accuracy			
N/A	Low (L)	Medium (M)	High (H)
Weights			
0	1	2	3

The low scores for non-response are driven by the low scores across a number of products. For LFS the mitigation strategies through calibration have helped retain a relatively high score for this collection. For the SBR and hence GDP-Q, the current quality focus is on systems redevelopment and business profiling rather than addressing item and unit non-response.

3.2 Product Ratings and Recommendations

3.2.1. Labour Force Survey, LFS

Context

The Labour Force Survey (LFS) is a large and complex collection. The new focus of ASPIRE on fitness for purpose has encouraged a review of the key purposes of the survey, with the intention of building relationships with key users to better understand its use in national monetary and fiscal policy making. EU regulations clearly set out requirements for the LFS on a quarterly basis, but the accuracy requirements for those national users interested in it as a timely economic indicator are not so well understood or built into the design and analysis process.

The new quality focus for ASPIRE on fitness for purpose, coupled with the relatively poor awareness of the quality requirements of this key group of users, has resulted in a lower overall rating for LFS than for the individual sources of uncertainty.

The most important quality issues for the LFS continue to be non-response (non-contact rather than outright refusal) and measurement error. An evaluation study of the impact of non-response on estimates has been completed, and now that the apparatus has been set up, it is intended to monitor the impact of non-response regularly. Response rates for in house data collection have improved slightly over the last year while those for externally contracted data collection have fallen substantially, resulting in an overall fall in response rates. The recent contracting of additional hours of interviewing from the external provider has improved the response levels somewhat. Improvements in the call scheduling system, to ensure a spread of attempted contact times across times of day and time in the week, are also expected to help.

Measurement error is also recognised as a key risk given the changes in collection arrangements in recent times. Call monitoring is being regularly undertaken and is now providing timely feedback to interviewers to improve interviewing practice. At this stage, no metrics of the process are maintained so its use in evaluation of the level of error is limited to subjective measures. Consideration should be given to reviewing the subjective findings to date from this monitoring to identify areas of particular concern that can be codified and recorded as part of the monitoring process to enable quantitative analysis of interviewing quality over time and across interviewing groups.

A significant stream of development work for the LFS relates to the use of web-based questionnaires. The objective in the use of the web is to reduce the cost of handling the more straightforward respondents, in order to divert resources to the more difficult to enumerate populations. The current plan is to implement a web-based questionnaire for respondents in waves 2 to 8 who are classified as permanent employees in the first wave. Interviewing will revert to telephone interviewing if the respondent's labour force status changes. These changes can also be expected to impact measurement error and will need to be undertaken in a planned and tested way.

Progress towards prior recommendations

1. *New Collection Arrangements.* Statistics Sweden has bedded down its contract with an external provider, which collects 50% of the LFS sample. This has encountered some problems in terms of the incentives model used and has been revised to maintain response rates at a suitable level, with additional interviewing hours contracted. The internal collection has also moved to the new single Data Collection Department, with almost all interviews being conducted by the central team. Both internal and external collection areas are using call scheduling to ensure attempted contact covers a variety of time periods. Additional sources for telephone numbers are being used and rules are being developed on which number to use in the case of multiple numbers.
2. *Monitoring to reduce measurement error.* Both collection areas are using call monitoring to study interviewer practices and provide timely feedback and training to interviewers.

3. *Web Data Collection Development.* Web collection is planned for waves 2 to 8 for permanent employees. Testing of the instrument is intended for Autumn 2019 with more intensive testing in Spring 2020.
4. *Frame coverage.* LFS has recently completed and published a study of the impact of under and over coverage in the LFS estimates. The conclusion is that under coverage is important for some groups, and updating the sample to reduce this under coverage is planned. Over coverage appears to be relatively small, however it warrants continued monitoring, as it is likely to grow with immigration and an increased mobility of the working age population, and may dampen the ability of the survey to pick up changes in the economic cycle.
5. *Non-response bias analysis.* The analysis study undertaken in the past year has been published and it is intended to undertake this study regularly now that the apparatus has been set up.

Key recommendations for the coming two years

1. *Understanding user needs.* The current focus of the design of the LFS is on EU requirements; however the more demanding requirements may well be those of national users using the survey for monetary and fiscal policy. These requirements may generate new key design targets. LFS should build relationships with key economic users and gain a better understanding of their uses of the LFS and their requirements for accuracy.
2. *Understanding and measuring overall accuracy.* To help measure the overall accuracy of the LFS, and to flag growing areas of concern early, the key series produced should be regularly reviewed against other relevant data for coherence (e.g. labour data from other sources, and other economic indicator series).
3. *Developing web-based collection.* Effectively testing the impact of new collection instruments on key LFS series requires very large sample sizes. Knowledge already gained on mode effects internationally, in particular the USA, should be reviewed. It will also be useful to consider, in conjunction with users, if the development and testing strategy is to be focused on developing the most usable web-based form or on minimising any series break in the LFS series. The former may be more realistic particularly if non-response is to be minimised. As well, it will be important to develop, in conjunction with key LFS time series users, a strategy for implementing the new instrument. For example, one strategy might be to implement it gradually until half the sample is using it, then hold the implementation at this level for a period to allow relatively powerful testing for a largish statistical impact from the web instrument, before implementing fully.
4. *Non-Contact and measurement error.* Substantial work has been and continues to be undertaken by Statistics Sweden to reduce non-contact, and facilitate the collection of good quality data in the LFS. However, this appears to be resulting in a lot of initiatives in a high pressure production environment, to maintain current contact levels. It is recommended that a project also be set up that steps back from this work to consider more fundamental changes that may be appropriate to achieve good contact levels in the new social environment.

Figure 1. LFS Ratings, Round 8

	Average Score Current Round	Knowledge of the potential causes of uncertainty and their impacts	Communication with users and data suppliers	Available Expertise	Compliance with standards & best practices	Plans for mitigation activities	Results of mitigation activities and other evaluation findings	Importance to Overall accuracy (single sources of uncertainty)
Sub and sub-subcomponents of Accuracy								
Overall Accuracy	47	○	○	☑	○	☐	●	
Sources of uncertainty:	59							
-Sampling	60	☑	☑	☑	○	○	○	H
-Frame coverage	60	☑	☑	☑	○	☑	☐	L
-Measurement	65	☑	☑	☑	☑	☑	☐	H
-Non-response	55	☑	☑	○	○	○	☐	H
-Data processing	55	○	○	☑	☑	○	☐	M
-Model assumptions	60	○	○	☑	☑	☑	☐	M
Preliminary statistics compared with final statistics	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Ratings					Importance to Overall accuracy			
●	☐	○	☑	●	Not applicable (N/A)	Low (L)	Medium (M)	High (H)
Poor	Fair	Good	Very good	Excellent	Weights			
1-2	3-4	5-6	7-8	9-10	0	1	2	3

3.2.2. Consumer Price Index, CPI

Context

The CPI is the key measure of inflation, used by government and more widely by businesses and citizens. It is used for economic policy, as a deflator in the national accounts, and for indexation purposes. The Swedish CPI continues to be of very high standard, especially when compared with other countries. There is a strong development programme, taking in new data sources and innovative methods, with some initiatives that will continue to improve the accuracy of the index.

We consider sampling to be a major contributor to uncertainty, with around half the monthly rate of change of the CPI being within the 95% confidence interval. The choice of product offers by data collectors adds to sampling uncertainty, which could be reduced by using a larger sample size. The wider use of scanner data is helping to mitigate this.

There are questions to be resolved about how scanner and other transactional data sources can best be integrated into the CPI, as it is important that the CPI continue to measure the same products over time. This increased measurement uncertainty is offset by gains from not needing to transcribe so much data.

The continuing lack of a Household Budget Survey is a concern in the consideration of uncertainty due to model assumptions, and the use of more transactional data suggests a need for these processing systems to be reviewed.

Progress towards prior recommendations

1. *CPI error study.* The previous ASPIRE report (Biemer, Trewin and Kasprzyk 2017, 17) had recommended a study that would support a Total Survey Error approach to improving the accuracy of the CPI, providing an evidence base for further error reduction work. A model has been developed which shows the benefits that further work would bring. Work next year will focus on improving variance estimates.
2. *Extended use of scanner and internet data.* A number of projects have been completed, including food, fruit and vegetables, and non-alcoholic drink, package holidays, flights and rail travel. The use of scanner data has doubled over the last two years and now forms around a quarter of the index. This brings important measurement improvements, although the reduction in uncertainty from sampling is likely to be less, given the concentration in certain areas. The development has not included the more problematic areas, such as international internet purchases, and questions remain about the most appropriate way of making estimates from these data.
3. *Monitoring the work of price collectors.* The new tablets collect paradata about the quality of direct price collection, but using this for quality management is a lower priority given the expansion of scanner/ internet collection.
4. *CPI weights.* The previous ASPIRE report (Biemer, Trewin and Kasprzyk 2017, 47 and 53) recommended that given the unavailability of a Household Budget Survey, that there should be some investigation into other sources. Some limited work has been carried out.

Other accomplishments

1. A number of improvements have been made in specific areas which will improve measurement and uncertainty due to model assumptions, such as:
 - Measuring actual transaction prices after subsidies for dental services, and replacing web scraping with register data
 - Replacing the unit value index for electricity with a geometric index
 - Using an improved price model for prescription drugs
2. Minor improvements have been made to the calculation of the lowest level of weights.

Key recommendations for the coming two years

1. *CPI weights.* It is important that work on alternative sources to the Household Budget Survey should continue, and be given more emphasis. Work should be done to see how sensitive the CPI is to changes in the weights, so that it is clearer how significant this problem is. Alternative sources might include transactions data, including loyalty card data.
2. *Data processing of scanner data.* Data processing systems for scanner data were built at a time when this initiative was experimental. Given its rapid development to a stage where it is an important part of the CPI source data, consideration needs to be given to developing an IT processing platform more in line with office processing standards to ensure processing risks are reduced.
3. *Statistical estimation from large data sets.* The use of scanner data, web scraping, APIs and register data has led to the collection of large data sets of prices for items, rather than the collection of single prices by data collectors from shops. Consideration needs to be given as to how these data sets can best be distilled into price indicators, taking into account the price behaviour of consumers.

Other areas for consideration

1. *CPI error study.* The work on improving variance estimates should be taken forward and should then be developed to enable the development of the Total Survey Error approach, which will show where further effort on accuracy improvement should be expended.

Figure 2. CPI Ratings, Round 8

	Average Score Current Round	Knowledge of the potential causes of uncertainty and their impacts	Communication with users and data suppliers	Available Expertise	Compliance with standards & best practices	Plans for mitigation activities	Results of mitigation activities and other evaluation findings	Importance to Overall accuracy (single sources of uncertainty)
Sub and sub-subcomponents of Accuracy								
Overall Accuracy	58	○	●	●	●	●	○	
Sources of uncertainty	63							
-Sampling	67	○	○	●	●	●	○	H
-Frame coverage	65	●	●	○	●	●	○	M
-Measurement	68	●	●	●	●	○	○	H
-Non-response	55	○	○	●	●	○	●	L
-Data processing	60	●	○	●	●	○	●	H
-Model assumptions	58	○	○	○	○	●	○	H
Preliminary statistics compared with final statistics	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Ratings					Importance to Overall accuracy			
●	●	○	●	○	Not applicable (N/A)	Low (L)	Medium (M)	High (H)
Poor	Fair	Good	Very good	Excellent	Weights			
1-2	3-4	5-6	7-8	9-10	0	1	2	3

3.2.3. Producer and Import Price Index, PPI

Context

The PPI presents the average price changes at the producer and import stages, in total and for different product groups. The PPI provides very important input to the National Accounts when calculating GDP in constant prices. PPI also makes an important contribution to evaluating current monetary policy. Important development work has been initiated and conducted, and due to the increasing complexity of the dynamics of the markets, further development is needed to maintain the relevance of the statistics for the future uses.

The quality awareness in the PPI team has enabled them to identify areas of improvement, leading to quality initiatives and plausible strategies. The PPI is interlinked with other statistics and development work for the sources of uncertainty will require managed cooperation across the wider statistical process and assessment of interdependencies. The new focus of ASPIRE is on fitness for purpose, which underlines the need to study these interdependencies, and the quality impacts on the secondary statistical uses.

To progress the identified and planned quality improvements in the PPI, systematic allocation of resources, cooperation across statistics and project management will be required. Some quality improvements of the PPI for sources of uncertainty can be progressed through strengthening the cooperation within Statistics Sweden. Some improvement areas however reflect changes in the economy and markets that require solutions developed in cooperation with other NSIs, Eurostat and the European Central Bank (ECB) and piloting novel methodologies within the international statistical framework.

Progress towards prior recommendations

1. *Measure the Price of Trade Margins.* The previous ASPIRE round recommended developing the measurement of the price of trade margins (Biemer, Trewin and Kasprzyk 2017, 19). A promising pre-study already exists. Future work has been planned and Eurostat Grant funding has been sought for next year. Conditionally on the Grant funding, the price of trade margins is planned to be published in 2020 for wholesale and retail trade. In addition, the European Central Bank is progressing a project on trade margins, which encourages further focus on this area.
2. *Monitor Quality Adjustments.* These recommendations are a continuation from the previous rounds. This development work is very challenging and the quality adjustments are complex, requiring further work. The methodology of the CPI and PPI are being studied together, and further work is required to harmonise methodologies between these indices and to develop transparency and coherence of the methodologies. For example, hedonic methods are being used in some areas in the CPI, but not in the same areas in the PPI.
3. *Evaluation of measurement error.* Evaluation of the impact of the questionnaire has been recommended to improve measurement (Biemer, Trewin and Kasprzyk 2017, 19). Since the last ASPIRE evaluation, the questionnaire has been improved according to Statistics Sweden's cognitive lab's recommendations. However, it is difficult to prove how much the changes have improved the measurement of the PPI as the respondents make subjective assessments albeit based on clearer instructions.
4. *Expanding coverage of imports and exports of services.* The proposed work in this area has been strongly supported, following the high growth in trade in services. In 2019 the coverage of the frame has been improved which will be realised in 2021. For some product groups, the coverage of imports and exports of services is good, but for certain groups non-response is higher than desirable for the National Accounts. There are plans to invest more effort to raising response rates for these groups.

Other accomplishments

1. The CPI board has now been broadened to include the PPI, and the construction cost index has been launched in 2019.
2. For process quality, there is now a quality function in the PPI team. The detection of incidents is reported and measures taken promptly. This further improves procedures and checks.

3. The production system of PPI is well documented which makes data processing quite easy for new recruits. For macro-editing, Visual Analytics in SAS is being used which enables systematic assessment of data and better understanding of the developments regarding overall accuracy and relevance. It also provides good conditions to harmonise macro-economic statistics.
4. There are plans for reducing frame uncertainty.
5. The index methodology is proactively being evaluated and there is an ongoing study focusing on applying arithmetic averages of study domains and geometric averages for services.

Key recommendations for the coming two years

1. *Measure the Price of Trade Margins.* Continuing to develop the measurement of the price of trade margins is important. Future work that has been planned using the Eurostat Grant proposal is recommended to be taken forward.
2. *Monitor Quality Adjustments.* We continue to support a recommendation for a measure comparable to the Implicit Quality Index of the CPI for the PPI. The required information on quality adjustments in the PPI is now available to enable compiling an Implicit Quality Index.
3. *Coverage.* To improve the coverage of the PPI, further work on the coverage of the imports and exports of services as well as on investigating how to cover the new innovative products that enter to the markets is recommended. As the sampling frame is two years old in the statistics production process, plausible procedures to update the sample in relation to new businesses, services and new market products should be investigated. Plans should be taken forward that examine how to increase response rates for those groups that have too high non-response for the National Accounts.
4. *Coherence and fitness for purpose.* The existing list of activities should be developed into an action plan, to align the PPI and CPI methodologies and to increase the coherence between the two indices. Furthermore, coherence with other economic statistics important for macro-economic indicators, i.e. price statistics and the National Accounts, should be explored.

Figure 3. PPI Ratings, Round 8

	Average Score Current Round	Knowledge of the potential causes of uncertainty and their impacts	Communication with users and data suppliers	Available Expertise	Compliance with standards & best practices	Plans for mitigation activities	Results of mitigation activities and other evaluation findings	Importance to Overall accuracy (single sources of uncertainty)
Sub and sub-subcomponents of Accuracy								
Overall Accuracy	53	○	○	○	○	○	●	
Sources of uncertainty	55							
-Sampling	55	●	○	●	●	●	●	H
-Frame coverage	58	○	○	●	●	○	●	M
-Measurement	53	○	●	○	●	○	●	H
-Non-response	57	○	○	●	○	○	●	L
-Data processing	58	●	○	●	●	○	●	M
-Model assumptions	52	○	●	●	●	○	●	H
Preliminary statistics compared with final statistics	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Ratings					Importance to Overall accuracy			
●	●	○	●	○	Not applicable (N/A)	Low (L)	Medium (M)	High (H)
Poor	Fair	Good	Very good	Excellent	Weights			
1-2	3-4	5-6	7-8	9-10	0	1	2	3

3.2.4. Statistical Business Register, SBR

Context

The method used in evaluating the quality in the Business Register (BR) through ASPIRE has changed from Round 7 (see section 2). As for other products, there is a new focus on 'fitness for purpose'. In addition, the categorisations of sources of uncertainty for the register have been brought in line with those for other statistical products. This means that the ratings provided in this round are not comparable with previous ratings.

The BR has had a continued heavy development program which offers the potential for improvement in the quality of the register for statistical purposes. Profiling of the largest businesses has started to feed through to the register. The BR has been relabelled as the SBR, although there has not yet been action on a key aspect of the SBR: namely implementing an activity status to reduce the level of over-coverage.

Quarterly situation registers are produced (March, May, August and November) to provide common frames for annual and sub-annual economic surveys, however sub-annual surveys do not yet appear to be planning to move to quarterly frames given the work involved in 'tidying up' and reconciling multiple frames in a year.

Progress towards prior recommendations

1. *Co-ordination of economic statistics.* BR staff continue to play an active role in the reengineering and SAMSTAT projects.
2. *Profiling enterprises.* 20 of the largest enterprises have been profiled and some loaded to the register. 40 are expected to be loaded by the end of May 2019. In total 150 are programmed to be profiled by the Coordination and Analysis Unit. Communications between this Unit and the Register Unit are good with clear roles and responsibilities defined.
3. *Development of the Statistical Business Register (SBR).* While the BR has been labelled the SBR, this version does not make use of an activity status to identify non-active units that should not be included on statistical frames.
4. *Accuracy of NACE coding.* Some analysis of NACE coding in the construction industry, and the feasibility of using occupation coding to identify incorrect NACE codes was investigated. The conclusion was that while the occupation coding provided an indicator of a potential NACE miscoding, it did not allow correct codes to be determined. The work has not been pursued further, or other work initiated at this stage.
5. *Quality Declaration.* A quality statement for the 'SBR and the Situation Registers' has been developed for the first time, using the template 'Production and Quality of the Statistical Register'. The plan is for the document to be made public on Statistic Sweden's web site.

Key recommendations for the coming two years

1. Continue to maintain strong focus on successfully concluding the re-engineering project, and on supporting the profiling of the largest business units. Develop a plan and implementation strategy, including an evaluation strategy, for the automated profiling which covers the next largest units.
2. Develop a true SBR by liaising closely with surveys on key requirements to ensure the quarterly frames as well as annual frames are usable and used. This would include both implementation of an activity status code, and a centralised approach to frame validation to reconcile differences between quarterly frames. This would improve the ability of the surveys to support high quality economic indicators, improve coherence between surveys, and improve the cost effectiveness of survey operations by validating quarterly frames once, centrally, for all surveys. The Register Unit should set up some quality monitors of the SBR from those surveys using it, (for example estimated over

coverage by industry on the SBR, estimated NACE miscoding by industry, estimated proportion of total value added that is miscoded on the register).

- Review the design and size of the Register Unit's business units survey in the light of the potential for automating detection of likely new locations using employee address information. Currently business unit surveys follow up all multi location businesses every year, but other large businesses are only followed up when they are first added to the register. The units survey is currently only 8,000 per year. Consideration should be given as to whether this is still an appropriate size and whether it is optimally targeted for the key uses of the register, or whether additional sources could indicate larger 'single' location businesses that warrant being surveyed.

Other areas for consideration

- The Register Unit has close ties with the Tax Office, the key source of its information, and recognises the need to build this key relationship further given the importance of this agency in risks to, and opportunities for, the BR. Regular meetings at various levels between the agencies will strengthen this relationship. The out-posting of a Statistics Sweden officer to the Tax Office is another possibility that might be considered.

Figure 4. SBR Ratings, Round 8

	Average Score Current Round	Knowledge of the potential causes of uncertainty and their impacts	Communication with users and data suppliers	Available Expertise	Compliance with standards & best practices	Plans for mitigation activities	Results of mitigation activities and other evaluation findings	Importance to Overall accuracy (single sources of uncertainty)
Sub and sub-subcomponents of Accuracy								
Overall Accuracy	55	○	○	○	○	○	○	
Sources of uncertainty:	58							
-Coverage	62	○	○	●	○	●	○	H
-Measurement	58	○	○	●	○	○	●	H
-Non-response	47	○	○	○	○	●	○	L
-Processing	62	●	●	●	○	●	●	H
-Model assumptions	52	○	○	●	○	○	●	M
Preliminary register compared with final register	N/A	N/A	N/A	N/A	N/A	N/A	N/A	

Ratings					Importance to Overall accuracy			
●	●	○	●	●	Not applicable (N/A)	Low (L)	Medium (M)	High (H)
Poor	Fair	Good	Very good	Excellent	Weights			
1-2	3-4	5-6	7-8	9-10	0	1	2	3

3.2.5. Quarterly Gross Domestic Product, GDP-Q

Context

The GDP-Q estimates are produced from a very large and complex set of inputs and are compiled using recognised international standards. They provide the fundamental measures of growth for the economy and are among Statistics Sweden's key products.

In this review we looked particularly at how the national accounts are responding to the new quality focus towards 'fitness for purpose', which requires a good understanding of the purpose of the statistics and the accuracy needed by key users.

The assessment has moved away from a breakdown of error sources specific to national accounts, based on stage of production, towards the structure given by the Swedish quality concept for Accuracy which is generic for all statistical products, now used in ASPIRE. We recognised in our assessment that some aspects of this are more relevant to national accounts than are others.

Progress towards prior recommendations

1. *Household Consumption Data.* Concern had been expressed that because of the length of time since the last Household Budget Survey, the benchmarks used for the household consumption component were out of date. The report (Biemer, Trewin and Kasprzyk 2017, 33) recommended looking at alternative sources, and that sensitivity analysis be performed on the effect of out of date benchmarks for commodity groups with high growth rates, high volatility or rapid price change. While the Household Budget Survey is no longer a viable source, some alternative sources are being used in the current benchmark study.
2. *Training of staff.* The report (Biemer, Trewin and Kasprzyk 2017, 33) recommended more formal training for new staff, using new technologies and using existing material available from other NSIs. We were pleased to see that two day courses have been set up (held three times a year), and there are plans for study groups using the OECD book, Understanding National Accounts. Also, it is good to know that the Riksbank are to be included in future training.
3. *Merchanting.* While improved profiling would offer the best solution to improved estimates of merchanting, collaboration within the office could, in the short-term, increase the knowledge of merchanting activity of the largest Swedish businesses. A report on this has been produced and is beginning to be implemented by the inclusion of additional questions on the Trade in Services collection.

Other accomplishments

1. *Flash estimates.* Work is advanced on producing flash estimates of GDP for publication later this year. There have been discussions with users on the range of accuracy needed.
2. *Benchmark revision.* This is a substantial piece of work which will lead to improvements in the quality of the accounts as more up to date benchmark sources are used. It will be important for users to understand the impact of the different sources of revisions when this is published.

Key recommendations for the coming two years

1. *Household Consumption Data.* Work needs to continue to find a sufficient and more robust data source solution, using the experience of other statistical offices. Data sources are most likely to come from the supply side and sources such as scanner data should be investigated.
2. *Quarterly Business Survey.* We understand that the survey planned for 2018 was shelved. A quarterly survey will provide a short-term measure of intermediate consumption. Currently the national accounts assume that, in the short-term, the growth in value added matches that of production, which is a simplified assumption and may not hold true in different phases of the business cycle.

This could mean that quarterly GDP may not accurately pick up turning points in the economy. We recommend that consideration is given to carrying out this survey as soon as possible.

3. *Implementation strategy for the new IT system.* National accounts are moving towards the completion of their new IT system which will have a major impact in reducing data processing risk and also give new possibilities for macro-economic analysis. Putting such a system into operational use can add to risk and national accounts need a well-considered implementation plan taking account of the additional risks to their operations during implementation, taking account of other changes happening around the same time such as the benchmark revision.

Other areas for consideration

1. *Coherence with other economic statistics.* National accounts form, together with other economic statistics, a picture of how the economy is developing. Comparisons with those other statistics, such as Balance of Payments, will not only provide a fuller story for users, but will also provide evidence of where quality improvements might be needed in the accounts, and lead to a more coherent set of economic accounts.
2. *Regular revisions analysis.* National accounts have published analysis of the revisions to GDP in the quality declaration. A regular detailed analysis of the size of revisions and their causes would help inform users of the quality of the statistics.
3. *Use 'Needs of National Accounts' to set priorities.* The national accounts team has produced a document that sets out the ideal requirements for the accounts. This could be used to set priorities for development, and influence the setting of priorities at the Statistics Sweden level.

Figure 5. GDP-Q Ratings, Round 8

	Average Score Current Round	Knowledge of the potential causes of uncertainty and their impacts	Communication with users and data suppliers	Available Expertise	Compliance with standards & best practices	Plans for mitigation activities	Results of mitigation activities and other evaluation findings	Importance to Overall accuracy (single sources of uncertainty)
Sub and sub-subcomponents of Accuracy								
Overall Accuracy	55	○	○	○	●	○	●	
Sources of uncertainty:	55							
-Sampling	42	○	○	●	●	●	●	L
-Frame coverage	62	○	○	●	○	●	○	M
-Measurement	52	○	○	●	●	●	●	H
-Non-response	47	○	○	○	○	●	●	L
-Data processing	55	○	○	○	●	●	●	M
-Model assumptions	62	○	○	●	●	●	○	H
Preliminary statistics compared with final statistics	67	●	○	●	●	●	○	

Ratings					Importance to Overall accuracy			
●	●	○	●	○	Not applicable (N/A)	Low (L)	Medium (M)	High (H)
Poor	Fair	Good	Very good	Excellent	Weights			
1-2	3-4	5-6	7-8	9-10	0	1	2	3

4. Cross-Cutting Issues and Recommendations

4.1 Clarifying ‘fitness for purpose’ with key users

Most product areas follow good practice in maintaining close relations with their key users. The new focus on ‘fitness for purpose’ as the basis for accuracy assessments in Statistics Sweden requires a deeper discussion with these users on what their quality requirements are. These discussions need to explore the specific policy uses that the key users have, so that Statistics Sweden has a clearer understanding of the levels of accuracy needed. This dialogue will have the benefit of raising the awareness among users of the inherent uncertainty within official statistics, as well as enabling statisticians to design statistical systems that are fit for purpose for these uses.

4.2 Measuring movement

Many Statistics Sweden outputs are used as economic indicators. Interest in the data for this purpose intensifies in periods of upturn or downturn in economic activity. Quality attributes of particular interest to users in these periods are coherence between alternative indicators and the speed with which the indicators pick up real changes in the rate of growth.

Not all Statistics Sweden collections feeding into such economic indicators, are currently designed to optimise for these qualities. Four areas in particular might be looked at to provide better information on changes in economic growth rates.

1. Frames for sub-annual business surveys are generally extracted annually rather than quarterly. This means growth for new businesses must be modelled rather than measured. Depending on the method of modelling and the currency of the data used, this is likely to delay the detection of economic change.
2. The design of the LFS is not optimised for measuring change. While the rotation strategy used is quite powerful for measuring smoothed seasonally adjusted monthly movements, these are not generally the series published. The rotation design generates high levels of volatility on month-to-month movements for original or seasonally adjusted series. Furthermore, the sample is only updated on an annual basis.
3. The sample allocation for the LFS is optimised to satisfy EU regulations rather than constraints on monthly or quarterly movement. Whether this would have a large impact on the efficiency of the sample for measuring movement is difficult to say without evaluation.
4. A quarterly business survey will provide a short-term measure of intermediate consumption. Currently the national accounts assume that, in the short-term, the growth in value added matches that of production, which is a simplified assumption and may not hold true in different phases of the business cycle.

In many cases the volatility of month to month movements (LFS) or the growth bias due to using annual rather than quarterly frames (business surveys or outputs based on them) is mitigated in outputs by using year on year growth measures. However, this has the effect of delaying the detection of upswings and downturns in the economy and displacing them by about 6 months (Linacre and Zarb 1991, Statistics Sweden 2013).

4.3 Defining the needs of citizen users

The strategic direction of Statistics Sweden requires more attention to be given to the needs of the ‘citizen user’. For all product areas, this will require some thought, but it is likely to lead to work on how data is presented, providing simplified analysis on the web, and working with intermediaries, such as journalists. In all this work, considering how the quality of the statistics can best be explained will be important.

4.4 Strengthening relationships with administrative data suppliers

Statistics Sweden is recommended to review systematically how cooperation between administrative data providers and Statistics Sweden could be strengthened in for example, SLA agreements for data sharing and knowledge transfer between organisations. Nominating liaison officers and facilitating rotation of key staff between organisations would provide the means for mutual enrichment of knowledge. Data providers would improve their knowledge of the further usage of their data, gain feedback on the quality of register data, and prior knowledge of how changes in administrative data affect the use of register data in the statistical process. Statistics Sweden would improve their knowledge of how the administrative data sources are compiled and the associated sources of uncertainty and could possibly improve their processes in collaboration with the administrative data provider.

5. High Priority Recommendations

We have identified the recommendations that we consider highest priority for improving the fitness for purpose of the reviewed products. Priorities were assessed on the basis of impact and viability with cost being an important aspect of viability. Many will require additional resource allocations to enable the work to be done but others should be able to be undertaken by product areas by shifting their priority areas. The overarching recommendations mostly fall into this category.

Overarching recommendations

1. *Clarifying 'fitness for purpose' with key users.* The new focus on 'fitness for purpose' as the basis for accuracy assessments by all products in Statistics Sweden (e.g. see section 3.2.1 for discussion on LFS) need to explore the specific policy uses with these users to have a clearer understanding on what their quality requirements are (see section 4.1) .
2. *Measuring movement.* Not all collections feeding into such economic indicators, are currently designed to optimise to measure movements. Four areas in particular might be looked at, (i) the use of quarterly frames for sub-annual business surveys, (ii) optimising the design of the LFS to measure month-to-month movements, (iii) more frequent updates of the sampling frame used for the LFS, and (iv) quarterly business survey (see section 4.2, section 3.2.4 and section 3.2.5).
3. *Strengthening relationships with administrative data suppliers.* Statistics Sweden is recommended to review systematically how the cooperation between administrative data providers and Statistics Sweden could be strengthened in SLA agreements, for example, for data sharing and knowledge transfer between organisations (see sections 5.4 and 3.2.4).

Product specific recommendations

Consumer Price Index and National Accounts

4. *Household Consumption data.* Building on the experience of other statistical offices, it is important that work on alternative sources to the Household Budget Survey should continue and be given more emphasis to provide more reliable data for weighting of household consumption within the CPI and GDP-Q (see sections 3.2.2 and 3.2.5).

Labour Force Survey

5. *Non-Contact.* There are a lot of initiatives, in a high pressure production environment, to maintain current contact levels. It is recommended that a project also be set up that steps back from this work to consider more fundamental changes to achieve good contact levels (see section 3.2.1).

Consumer Price Index

6. *Data processing of scanner data.* Data processing systems for scanner data are now an important part of the CPI source data, and consideration needs to be given to developing an IT processing platform more in line with office processing standards to reduce processing risks (see section 3.2.2).

Producer Price Index

7. *Coverage.* To improve the coverage of the PPI, further work in the coverage of the imports and exports of services as well as on investigating how to cover the new innovative products that enter to the markets is recommended, and plausible procedures to update the sample in relation to new businesses, services and innovative products should be investigated.

Statistical Business Register

8. *Re-engineering Project.* Continue to maintain strong focus on successfully concluding the re-engineering project, and on supporting the profiling of the largest business units. Develop a plan and implementation strategy, including an evaluation strategy, for the automated profiling which covers the next largest units (see section 3.2.4).

Quarterly GDP

9. *Implementation strategy for the new IT system.* National accounts are moving towards the completion of their new IT system. National accounts need to start thinking about how best to implement the new system while reducing the risk to their operations taking account of other parallel activities such as the revision of benchmarks (see section 3.2.5).

6. Considerations for the future

As outlined in Section 2, significant changes were made to ASPIRE this round. The ASPIRE processes were adjusted accordingly but it was not possible to do a full-scale pilot test beforehand. Nevertheless, the revised processes worked reasonably well but we have identified some areas for improvement.

There were some adjustments to the checklists as a result of the changes to ASPIRE. However, it is clear that more changes are required and work will be undertaken on this prior to the next round. This is particularly the case for the National Accounts and other compilations (Environmental Accounts for the next round).

The framework used for the sources of uncertainty (*Frame coverage, Sampling, Measurement, Non-response, Data processing and Model assumptions*) was a change compared to the previous rounds. It is however reasonably close to the previous framework (for error sources) and there were no real issues regarding surveys. However, for the National Accounts and statistical registers (e.g. SBR) the new approach is quite different. These are discussed separately below.

Previously, for National Accounts, one of the most important error sources included in the reviews was (the most significant) source data. These are not covered explicitly in the new framework which is considered further below. The previous framework also included Deflation and Balancing. These are covered under *model assumptions* with the new framework. Model assumptions can also be used to mitigate other sources of uncertainty (e.g. measurement error) and should be considered under the appropriate source of uncertainty. In the previous framework, *frame coverage, sampling, measurement and non-response* were not considered separately but as part of the analysis of the most significant source data.

It is worth noting that we are evaluating the product not the area responsible for producing the product. In this light, *frame coverage, sampling, measurement and non-response* should refer to the source data. The checklists were not prepared with this in mind and need to be redesigned. This also raises questions which should be addressed before the next round, of who completes the checklists, and whether and how source data areas should be involved.

Another discontinuity with National Accounts is that *Model assumptions*, which are one of the most important sources of uncertainty in the national accounts (and other compilations), receive a much lower weight compared with the previous ASPIRE framework. One way of dealing with this might be to adjust the weighting for National Accounts. For example, if it were given a weight of 5 (very high importance) because of their extensive use in the compilations of the National Accounts. This would bring it more in line with the weight given previously to *Model assumptions*. This issue will be considered prior to the next ASPIRE round. If it is decided to implement this change, it would not be difficult to recompile the score for the previous round.

The new 'source of uncertainty' framework is a closer fit to what was previously used for registers especially with the deletion of *sampling* from the framework for registers. The main area of contention is that *Coverage* was broken down into three parts in the previous ASPIRE approach – over-coverage, under-coverage and duplication. Accordingly, *coverage* receives a much lower weight than it did previously creating a discontinuity. As with National Accounts, this could be resolved by the introduction of a weight of 5 (signifying very high importance) for *Coverage*.

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