

FORUM ON TAX ADMINISTRATION

OECD Tax Administration Maturity Model Series

Analytics Maturity Model

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This document was approved by the Committee on Fiscal Affairs on 1 June 2022 and prepared for publication by the OECD Secretariat.

Please cite this publication as:

OECD (2022), Analytics Maturity Model, OECD, Paris.

www.oecd.org/tax/forum-on-tax-administration/publications-and-products/analytics-maturity-model.htm

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Preface

Analytics is increasingly becoming a common and integrated part of tax administrations across the world, in developed and developing countries alike. Administrations find use for analytics for operational purposes like reporting, risk modelling and fraud detection as well as for uncovering insight used to improve their efficiency and effectiveness. A recent FTA report on digitalisation suggested benefits of using analytics in seventeen different areas within management, taxpayer services, compliance, and tax functions.¹

Administrations that consider investing in analytics often need to assess their current status and research common practice for the area. We are therefore pleased to present to the international tax community the Analytics Maturity Model from the Forum on Tax Administration, which can be used for self-assessment as well as for comparison with other administrations.

We would like to express our sincere thanks to the analytics experts from Canada, Ireland, New Zealand, Norway and the United Kingdom who helped draft the model in collaboration with the FTA Secretariat. Many thanks also to the members of the Analytics Community of Interest who helped with revision and piloting; the Asian Development Bank for their assistance in increasing pilot participation; and the many tax administrations across the world that have contributed to this report through self-assessment results.

The results included in anonymised format in this report reveal that very few administrations have consistently assessed themselves to be on a single maturity level across all indicative attributes, and many cover three levels. The results also show that there are attributes on the Emerging and Progressing levels for around 90% of the participations, indicating that many administrations deem that they have some way to go to reach a consistently Established level for analytics. This suggests that there is room for improvement in the area of analytics across both developed and developing countries.

We therefore believe that this model may prove useful regardless of the size, characteristics and location of the tax administration, and warmly encourage administrations to read and use the report.



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¹ OECD (2021), Supporting the Digitalisation of Developing Country Tax Administrations, Forum on Tax Administration, OECD, Paris. www.oecd.org/tax/forum-on-tax-administration/publications-and-products/supporting-the-digitalisation-of-developing-country-taxadministrations.htm

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Executive Summary

Analytics is increasingly becoming a fundamental and integrated part of tax administration, being used for operational purposes as well as for uncovering new opportunities for increased efficiency and effectiveness in fulfilling the administration mandate. The Analytics Community of Interest in the Forum on Tax Administration (FTA) has therefore, together with the FTA Secretariat, developed an Analytics Maturity Model to facilitate self-assessments by tax administrations globally of their maturity in the area of analytics.

Maturity models can aid tax administrations in self-assessing their current level of capability, developing a common, strategy-based understanding of what changes may be necessary, and contribute to identifying peers that may be able to share relevant experience.

This report contains three parts and an Annex:

- Chapters 1 and 2 introduce the model and offer suggestions for how to use it.
- Chapter 3 summarises the results of the self-assessments conducted by tax administrations that participated in the pilot phase.
- Chapter 4 contains the Analytics Maturity Model, which can be used for self-assessment and comparison with the anonymised results in the previous chapter.
- Annex A contains the forms that can be used to record the self-assessment process and results.

Caveat

Tax administrations operate in varied environments, and the way in which they each administer their taxation system differs with respect to policy and legislative environments as well as administrative practices and cultures. A standard approach to tax administration may be neither practical nor desirable in a particular instance. Therefore, this report and the observations it makes need to be interpreted with this in mind. Care should be taken when considering a tax administration's distinct practices to fully appreciate the complex factors that have shaped a particular approach. Similarly, regard needs to be had to the distinct challenges and priorities each administration is managing. In particular, not all parts of this Analytics Maturity Model will be relevant for all tax administrations.

1 Introduction

What are maturity models?

Maturity models are a relatively common tool, often used on a self-assessment basis, to help organisations understand their current level of capability in a particular functional, strategic or organisational area. In addition, maturity models, through the setting out of different levels and descriptors of maturity, are intended to provide a common understanding of the type of changes that would be likely to enable an organisation to reach a higher level of maturity over time should it so wish.

The OECD Forum on Tax Administration (FTA) has published other maturity models. The models and more information about their usage can be found at: <https://www.oecd.org/tax/forum-on-tax-administration/about/maturity-model-series.htm>.

The maturity model contained in this document covers the specialised area of analytics. Similarly to the previously published maturity models, the aim of the Analytics Maturity Model is to:

- Allow tax administrations to self-assess through internal discussions how they see their current level of maturity as regards the availability and usage of analytics.
- Provide senior leadership of the tax administration with a good oversight of the current level of maturity based on input from other stakeholders across the organisation. This can help in deciding strategy and identifying areas for further improvement.
- To allow tax administrations to compare themselves to their peers. An administration will know its own level and will be able to compare itself to other tax administrations by studying this report. It is also possible for tax administrations to reach out, through the Secretariat, to other tax administrations at different levels of maturity for peer-to-peer discussion and learning purposes.

Model development and preparation for publishing

An advisory group of tax administrations from Canada, Ireland, Norway and the United Kingdom developed the initial draft for this Maturity Model. The FTA Secretariat and the Chair of the Analytics Community of Interest (COI) from Revenue Ireland revised the draft, which was subsequently piloted among the COI members.

The FTA Secretariat received a large number of pilot assessments and many useful comments to the piloted draft. The co-chairs of the COI from Revenue Ireland and the Inland Revenue Department of New Zealand further revised the model with some assistance from the FTA Secretariat, to take into account the feedback.

The model has been through another revision in the FTA Secretariat before final piloting, and adjusted based on comments from the final round of piloting. In preparation for publishing, the results of the self-assessments conducted by pilot tax administrations have been added.

2 Using the Analytics Maturity Model

General background

Maturity models are generally descriptive in nature, with a focus on processes and the broad outcomes of those processes, rather than being heavily based on metrics. This recognises that even where the metrics chosen may indicate a good or less good outcome, they do not by themselves show how that outcome has been achieved, the sustainability of the outcome or its robustness and adaptability to changes in the external environment.

By their nature, maturity models are not prescriptive as to the details of processes nor as to how broad outcomes should be achieved. There is no one-size-fits-all nor any detailed method that should be preferred to another in all circumstances. There is also no judgement within the models themselves as to what the optimal level is for a particular tax administration. This will depend on their own circumstances, objectives and priorities.

What the maturity model will help an administration assess, though, is where they see themselves as to their current level of maturity and the kind of processes and broad outcomes they may wish to consider in order to improve their maturity. In addition, being able to compare themselves to other tax administrations, or to the average level of maturity of other administrations, can be a useful input to the consideration of whether the current level of maturity is the right one for them.

Maturity levels

The model sets out five levels of maturity. The reason for choosing five levels is to help make it easier for administrations to assess where they are by providing clear distinctions in the descriptions of maturity. This would become more difficult the more maturity levels there are. At the same time, having five levels helps to ensure that the distinctions between the levels are not so great that it becomes difficult for administrations to see the pathway to higher levels of maturity.

In designing the maturity model, it was decided to use the middle level, termed “Established”, to provide a description of where, on average, FTA members may be expected to cluster. Using this as an anchor, the other levels of maturity were fleshed out by trying to describe the pathway from an “Emerging” level to “Established”, and from “Established” to what might be possible in the future given expected developments. The five levels are:

1. **Emerging:** this level is intended to represent tax administrations that have already developed to a certain extent but which, at least in the area of analytics, have significant further progress they could make. The intention is that, in general, the descriptions of this level do not focus on what is not in place but rather on what is in place, while noting what some of the limitations might be.
2. **Progressing:** this level is intended to represent tax administrations that have made or are undertaking reforms in the area of analytics as part of progressing towards the average level of advanced tax administrations.

3. **Established:** this level is intended to represent where many advanced tax administrations, such as FTA members, might be expected to cluster.
4. **Leading:** this level is intended to represent the cutting edge of what is generally possible at the present time through actions by the tax administration itself.
5. **Aspirational:** the intention of this level is to look forward at what might be possible in the medium term as the use of new technology tools develops and as administrations move towards more seamless tax administration. Few tax administrations are expected to be consistently at this level currently, in particular since in some cases it requires cooperation external to the tax administration (such as whole of government approaches, access to a wide range of data sources etc.).

Layout of the maturity model

The Analytics Maturity Model is organised around the strategic perspective and the operational perspective to using analytics. To assist in the understanding of what a given level of maturity means, a set of indicative attributes is contained under each maturity level. As shown by the term itself, these are indicative and not determinative.

Not all of the indicative attributes under a particular maturity level will necessarily be present in a particular tax administration. A tax administration may also not fit all of the elements of a particular attribute. A further issue that may arise is that the self-assessment group will feel that it in some cases indicators of different maturity levels will be met within a particular theme, for example some “Progressing” indicators and some “Established” indicators.

There is no one-size-fits-all that can work across a large and diverse range of administrations. The attributes are therefore intended to help guide discussions rather than determine them. In using the model, tax administrations are asked to consider **the best fit for them**, taking account of both the descriptors and indicators. The self-assessment group will then need to determine which maturity level it best fits, based on discussions of the weight it attaches to the importance of particular indicators being present for the relevant descriptor. Hopefully, the information that it may not fit all of the indicators may also provide food for thought about possible areas that the administration may wish to consider further.

In some cases the indicative attributes may be additive across the maturity model, and this should hopefully be clear from the context. They will generally not be repeated across maturity levels. Where a tax administration meets a number of indicative attributes within the same row, then its level of maturity within that row will be the highest of the indicative attributes which are met. (For example if “Progressing”, “Established” and “Leading” indicators in one row are all met, then the level of maturity for that row would be “Leading”.)

It is important to repeat, though, that the indicative attributes are not determinative. Rather, they are intended to reflect what might be expected, in general form, to be in place at a particular maturity level which will differ from the level below (for example by virtue of being more demanding or representing a shift in approach).

Recommendations for the self-assessment process

The Analytics Maturity Model has been designed to be used as a self-assessment tool. To be effective, this self-assessment should be done in a way which makes the process as objective as possible and avoids group-think. The following key considerations are based on experience with using this and other maturity models:

- Sufficient time should be allowed for the self-assessment discussion. Feedback from administrations suggests that it may take from a few hours to a full day depending on the amount of preparation before the group discussion.
- Ideally, there should be a range of staff with analytics services and analytics usage responsibilities involved in the self-assessment, across grades. Care should be taken to ensure that the conversations can be frank and open, and people should be encouraged to express their views.
- It can be helpful to ask someone outside of the management chain for analytics to facilitate the discussions. This person should have read this report and understand the process for self-assessment against the model. As well as facilitating discussions, the person should be able to challenge the views of the self-assessment group, including asking for supporting evidence where appropriate.
- Consideration should be given to how to reach a view where there is a division within the self-assessment group on the appropriate assessment of maturity. The facilitator may, for example, have a tie-break role.
- In addition to the facilitator, consideration should be given to involving staff from other tax administration functions, ideally at a relatively senior level, to assist in the challenge function and to provide insights from their different perspectives. A number of administrations have reported that cross-organisational conversations when self-assessing can prove highly useful in joining-up different areas of business, helping people to see the scope for synergies and for mutual support in achieving the administration's objectives.
- Administrations sometimes find that their maturity matches several levels for a single indicative attribute, with descriptions from more than one level matching their understanding of the administration's situation. In these cases, the administration should choose maturity level that they find is best for their administration. In some cases, this may mean choosing the lowest level of maturity, because that will clearly signal internally in the administration that there is room for improvement.
- When decisions are taken on the level of maturity, it can be helpful to record the main reasons behind that decision. This will assist in preparing for changes as well as future use of the model within the tax administration, allowing an easier discussion of what, if anything, has changed.

Recording of self-assessments

The record sheet in Annex A can be used by tax administrations to record the results of their self-assessment as well as answers to self-assessment process questions and open questions regarding the model.

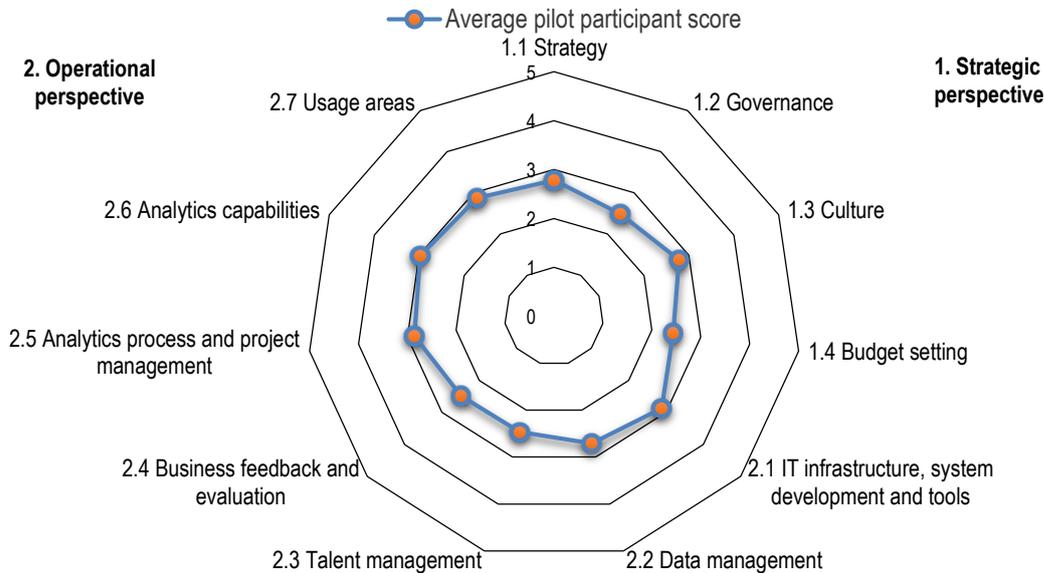
3 Results of pilot self-assessments

The Analytics Maturity Model has been tested through pilot self-assessments by 41 administrations from the Americas, the Asia-Pacific region and Europe. Most of the pilot administrations are FTA-members; twelve of the respondents are developing country tax administrations. The feedback from the pilot testing triggered a few minor textual adjustments and additional definitions. This chapter summarises the results from self-assessments carried out by tax administrations.

Self-assessment results

The self-assessment record sheets received from the pilot tax administrations show that the majority assesses the maturity of their analytics capacity and usage at “Established” maturity levels. This is visualised in Figure 3.1, which illustrates the average maturity level for each of the 11 indicative attributes across the Strategic and Operational perspectives of the model. This seems to indicate that the maturity model is well calibrated, as the Established level was designed to be a description of the average maturity level of FTA member administrations.

Figure 3.1. Results of the pilot self-assessments for the 11 indicative attributes of the model



Source: FTA Secretariat, based on self-assessment responses.

The detailed results illustrated in the heat map in Table 3.1 show how each of the 41 tax administrations assessed their maturity level across the indicative attributes. The results are anonymised to ensure that administrations are not influenced in their use of the Maturity Model by concerns about external perceptions. However, administrations that participated in the piloting of the model will be able to identify themselves based on their record sheet submission.

With the dark blue and light blue colours representing the self-assessed indicative attributes below the Established level, it is clear from the pilot results that many administrations find that they would need to make some changes before reaching an Established level of maturity across the entire field of analytics. This is further illustrated with additional statistics: 26 administrations self-assessed their average maturity level to be lower than Established, while 13 self-assessed their average level to be higher than Established.

Table 3.2. Average number of times a maturity level was used during self-assessment

Emerging	Progressing	Established	Leading	Aspirational
7%	32%	46%	15%	1%

Source: FTA Secretariat, based on self-assessment responses.

Finally, table 3.2 summarises the average number of times a maturity level was used during self-assessments of the 11 indicative attributes. This illustrates that although the Emerging and Progressing levels are selected more frequently than the Leading and Aspiration levels, the results are clustered around the “Established” category as intended when the model was built and calibrated. Therefore, for the time being there does not seem to be a need for adjusting the model.

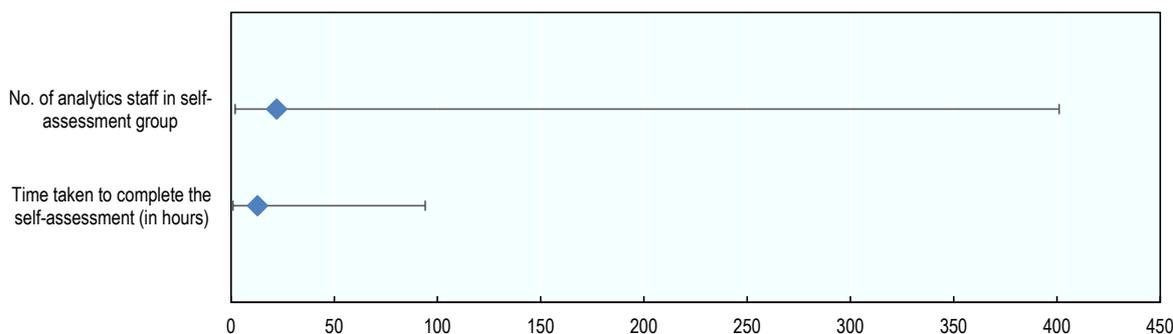
Self-assessment process

Feedback from the self-assessment process shows that the process varied considerably between the participating administrations, in terms of methodology used, the number of staff and managers involved as well as time spent on assessments:

- Some administrations informed us that they reused their assessment from the piloting of the draft model in 2021, and adjusted their responses according to the changes in the model and local circumstances, consequently only spending a few hours on the self-assessment. Other administrations reported devoting significant resources to the self-assessment process, spending more than a week to reach their conclusions.
- Around 45% of the administrations that responded to the question reported that they assigned a facilitator to organise the self-assessment process.
- While almost 95% of the administrations that responded reported that they managed to involve the appropriate range of staff in the self-assessment discussions, only 60% reported involving officials from other areas of the administration. Many, especially from smaller administrations, chose to do an assessment within the analytics team, reasoning that the team had sufficient insight into the capability and usage of analytics across their administration.

Figure 3.2 shows that the number of staff working with analytics or analytics services involved in the self-assessment process varied from 2 to 401, with a median of 7 and an average of 22. A similar disparity in time spent is also visible. Administrations reported spending between 1 and 94 hours to complete the self-assessment, with a median of 4 and an average of 13.

Figure 3.2. Minimum, median and maximum values for analytics staff in self-assessment group and self-assessment time



Source: FTA Secretariat, based on self-assessment responses.

Summary

The range and diversity in data available for tax administration analytics is expanding every year, and it is likely to increase faster with internationalisation of the economy in most jurisdictions. Complementing this improved opportunity for useful analytics source data, the methodology, tools and processing for more efficient and effective execution of analytics is continuously improving. The situation is therefore ripe for intensified utilisation of analytics in a taxation context, allowing administrations to better fulfil their mandate with the use of this type of methodology and technology.

With many pilot administrations assessing their analytics maturity level to be below the Established level, indicated by 39% of per-attribute assessments being Emerging or Progressing and only 16% being Leading or Aspirational², there seems to be significant potential for improvement. Given that these administrations represent most regions of the world, the set of pilot results are likely to give a good representation of the actual state of analytics capability and usage in tax administrations worldwide. It will be interesting to follow the development of this field in the years to come as further progress is made on the digitalisation and digital transformation of tax administrations.

² See table 3.2.

4 The Analytics Maturity Model

The organisation of the maturity model into two parts reflects the progression from determining the strategic approach to implementing the approach through practical action. Both parts also demonstrate the evolution from the use of analytics being initiated by individuals and teams within the administration, via well-regulated use of analytics for core tax administration functions, to the widespread use of analytics in seamless tax administration.

Strategic perspective

This part of the model focuses on the framework within which the analytics activities are carried out, by examining four factors: Strategy, governance, culture and budget setting. The governance of analytics is approached by examining the governance of analytics services, how analytics projects are prioritised, and the governance of ethics and transparency issues. The different maturity levels reflect the existence and sophistication of the analytics strategy and governance, and the effects of these through a maturing culture of widespread analytics usage and appropriate funding.

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Descriptor	Pockets of analytics knowledge and good practice may exist in some business units depending on the background and experience of individual managers and staff. At the administration level, although there are some senior sponsors, there is not a shared view of the role of analytics in improving tax administration.	The strategic importance of analytics for decision-making and the need for coordinated analytics services is largely understood at the senior level, but there is no overall strategy for analytics use in the administration. The development and use of analytics services are generally driven by individual business units.	A high-level strategy and organisational structure is in place for the coordinated use of analytics, and the governance of analytics services is managed at senior level. The importance of coordinated analytics services and use of analytics for more effective tax administration is prioritised by senior leadership. This is increasingly reflected in budget setting, project planning and IT development.	Analytics capabilities and practices are well-integrated into strategic planning, performance management activities and operational decision-making across the administration. The importance of integrating analytics with every aspect of tax administration is embedded into the administration culture. An end-to-end governance function for analytics ensures proper prioritisation and value for money.	Analytics capabilities and practices are fully integrated into the administration's strategy and the organisational processes supporting seamless taxation. The administration is innovation-focused at all levels with government-wide analytics coordination, supporting the use of analytics in assuring the proper application of tax rules within taxpayers' natural systems.
Indicative Attributes					

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Strategy	<p>While there is awareness of the power of analytics in some parts of the tax administration, there is not a consistent view across senior management as to how to develop the use of analytics for improving decision making across the administration.</p> <p>Although analytics are used to good effect in some business units of the tax administration, in other units there is little awareness of the potential of analytics to provide new insights, with many decisions taken solely on the basis of the knowledge and experience of individual tax officials (which may not be consistent across the administration).</p>	<p>The strategic importance of analytics for decision-making is recognised at senior level and it is encouraged by senior management, but there is no overall strategy for how to improve the use of analytics and analytics professionals in the administration.</p> <p>While the use of analytics is increasing, the development and use of analytics services are generally driven by individual business units, including on an on-demand basis, without cross-administration strategy-based coordination. This can lead to analytics work being carried out in silos and hinder the benefits of coordinated analytics.</p>	<p>A high-level strategy for analytics services is in place, setting out the role of analytics in enhancing the effectiveness and efficiency of tax administration functions and processes.</p> <p>While the strategy emphasises the importance of coordinated analytics services and improved analytics capability (including as regards the availability and use of data), analytics functions are not yet fully embedded in all business areas, which can affect prioritisation decisions.</p>	<p>A detailed strategic framework is in place for the coordination of analytics services and the integration of analytics into all business areas, including planning for a move towards more seamless tax administration.</p> <p>The analytics strategy is informed by extensive internal feedback and external research and is actively supported by senior management. There is increasing engagement with external stakeholders on the development of analytical capabilities to assure system integrity.</p>	<p>The development of the overall strategy to support seamless tax administration is informed and enabled by the use of analytics.</p> <p>The strategy for use of analytics within the administration and within taxpayers' natural systems is co-designed by the administration and external stakeholders, with the aim of enhancing trust and confidence in the integrity of the tax system.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Governance	<p>Analytics services governance arrangements differ between units because the overarching governance framework is lacking or ineffectual. Oversight is usually provided by the relevant manager without reference to administration-wide governance principles and with limited visibility at senior management level outside of major reform processes.</p> <p>Prioritisation between analytics projects takes place at the business unit level without consideration for administration-wide analytical needs. While informal networks of analysts may exist, there are no formal processes in place to drive coordination across the administration.</p> <p>Beyond compliance with privacy legislation, ethical and transparency considerations receive limited attention.</p>	<p>While a high-level and principles-based governance framework for coordinated analytics services is in place and supported by senior management, there is no centralised follow-up to ensure that this happens consistently, and there is a lack of guidance and support.</p> <p>Principles for prioritising and coordinating analytics projects are in place. Typically, though, analytical projects are initiated by organisational units to meet their own priorities rather than those of the administration as a whole, and often start because there is data available.</p> <p>Ethical and transparency matters arising from analytics activities receive some attention from some analysts and managers.</p>	<p>An analytics services governance team is supervised at senior management level, in close consultation with business units. Clear guidance is in place and being followed up for the prioritisation of analytics services development, ensuring that the needs of all business units are considered and that reuse and multiuse opportunities are utilised.</p> <p>Detailed governance processes are in place for to help ensure that analytics projects deliver maximum value to the administration as a whole. In practice, though, prioritisation decisions on some projects may be taken at individual business unit level.</p> <p>Ethical and transparency issues arising from analytics activities are usually considered by the analysts and their managers, but no consistent process is in place.</p>	<p>An analytics governance board is in place and end-to-end analytics services governance processes are defined, rigorously applied and monitored, to ensure alignment with the administration's business objectives. Analytics governance is integrated with the governance of other IT services, ensuring optimal resource use and prioritisation across the administration.</p> <p>There is co-ordinated oversight of analytics projects which ensures high value by prioritising projects in line with the overall administration strategy. This is a transparent and well-documented process.</p> <p>A comprehensive framework for considering the ethical and transparency dimensions of analytics activities is in place and well adhered to.</p>	<p>The analytics governance board incorporates external members to ensure that alignment between the administration's analytics processes and those used by other government units and taxpayers. This contributes to seamless taxation systems and integration of tax processes in taxpayers' natural systems.</p> <p>Analytics strategy and delivery is subject to regular independent expert review, including by parties outside the tax administration.</p> <p>Adherence to the ethical framework is routinely monitored, including through the use of AI, and subject to independent external review.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Culture	<p>Some individual teams and business units actively consider ways to make more effective use of analytics. However, there is no shared culture within the tax administration appreciating the benefits of analytics for the administration and taxpayers, and the benefits are not actively promoted by senior management.</p> <p>With a generally low level of data literacy and few programmes in place to improve the level, there is only intermittent understanding of data as a valuable asset and the role of analytics in tax administration.</p>	<p>There is a growing appreciation across the administration for the potential benefits of analytics, particularly at the senior management level. However, many operational staff remain reluctant to engage with analytical solutions or use results from analytics. There is limited understanding of where value can be added outside of risk management and audit.</p> <p>Data literacy is improving across the administration through basic training programmes, establishment of informal networks of analysts, and increased collaboration between analysts and other staff.</p>	<p>The value of analysing data is actively promoted by senior management and supported by the dissemination of examples, staff training and increased collaboration between analysts and business units on opportunities and results. There is noticeable appetite for analytical solutions in most business units.</p> <p>The general level of appreciation for data as a valuable asset is high among staff at all levels, with a culture of networking, cooperation and knowledge sharing across the administration in general. There is manifest emphasis, interest and understanding on the use of analytics for achieving tax administration objectives.</p>	<p>Managers at all levels see themselves as champions of digital transformation, and there is an active programme in place to motivate staff and foster a culture of innovation and change underpinned by the use of analytics across the administration.</p> <p>A strong and cooperative culture is in place across the administration for valuing analytics as part of the range of tools for enhancing tax administration processes, reducing burdens and improving the effectiveness of the tax administration. Data literacy is strong, supported by both basic and advanced training in the use of analytics.</p>	<p>The critical importance of analytics to seamless tax administration is embedded in core administration professional values. The consequences of this attention is visible in day-to-day behaviours and in an organisational culture focused on innovation.</p> <p>All levels of the organisation understand the analytical process and will identify opportunities for using analytics to ensure the optimisation of the tax system. This culture is supported through continuous training and development which meets the needs of advanced analysts, ad hoc analysts and users.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Budget setting	Budget planning for analytics investment and spending tends to occur on a project or business unit level based on previous year's outcomes, with little consideration for current or future administration-wide needs.	Coordination of budget planning for analytics investment and spending across the administration is generally limited to significant analytics projects. There is some analysis of the holistic impacts of budget changes.	The analytics governance team carries out analysis to inform budget planning through engagement with business units, taking into account cross-cutting objectives. Consideration is given to the impacts of investments and spending to enhance analytics capabilities, largely focused on medium-term objectives.	The analytics governance team considers the cost and benefits of long-term strategic investment and spending in enhanced analytics capabilities. The budget planning process is coordinated with other IT-related functions, ensuring harmonisation with the administration's longer-term objectives for digital transformation.	The budget planning process for analytics investment and spending is fully integrated into administration-wide budget setting processes, taking account of and supporting the integration of tax compliance analytics functions embedded in taxpayers' natural systems.

Operational perspective

This part of the model examines how management and staff in the administration choose to act as the strategy and governance framework develops. The effects of the strategic approach on operations are examined through a range of factors, which can largely be grouped as the technological foundation of analytics and the use of analytics. The evolution in maturity is reflected in increased quality and scope of the technological foundation for analytics, growing management and staff support inside and outside the analytics teams for the usability of analytics, increased professionalism in organising the analytics work and using the results, and an increasing range of areas benefiting from analytics.

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Descriptor	Data sources are only partially digitised, the administration lacks a common infrastructure for analytics services, and there are recurrent issues with data quality. Most analytical work is undertaken at the initiative of the analyst or in response to requests from individual users. Analytics tools and techniques are rudimentary. Analytics projects generally do not involve the operational staff.	A common analytics services infrastructure is in place, but it is not well maintained and has limited analytics tools. Most internal data is digitised, and some of it is available in a centralised repository although data quality varies. Analytical needs and opportunities are sometimes considered in the purchase and development of IT systems. Analytics is not yet seen as a core function within the administration. While analysts generally have good basic skills, some opportunities for training and access to basic analytics tools, there is a lack of engagement by most business units, resulting in underuse of analytics.	The common analytics services infrastructure is well maintained, and necessary analytics tools are provided. All significant data sources are digitised, and there is easy access to most data used for analytics, including third party sources, with acceptable matching levels. There is increasing proactive cooperation between analysts and operational staff. Advanced analysts have a good understanding of statistical thinking and key modelling techniques.	Analytics services are frequently enhanced by emerging technology. All core datasets are comprehensively documented. There is increasing use of unstructured data and big data. Users have access to good-quality operational datasets, complemented by a wide range of third-party sources. The administration utilises analytics tools and advanced techniques effectively across the administration. Analysts work proactively with operational managers to identify business problems and to design and communicate practical solutions, using a broad range of modelling and exploration techniques. Operational users are fully involved at all stages of	The administration uses the latest analytics tools, all available structured and unstructured data and – where applicable - agile techniques to maximise tax compliance and minimise burdens. Data is clean and fully documented, and increasingly available in real-time if relevant. Analytics and project management capabilities are maintained at the cutting edge, with a strong focus on enabling analysts and operational users to take maximum advantage of the opportunities available. Advanced analysts are trained to postgraduate level in statistical modelling and machine learning, and use a full suite of data visualisation, natural language processing and artificial intelligence tools.
Indicative Attributes					

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
/				analytics projects. Analytics informs all tax administration functions, including through a growing number of automated analytics processes.	

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
IT infrastructure, system development and tools	<p>The administration lacks a common infrastructure for analytics services; most data systems are separate, and there is no central repository for data exploration. New opportunities offered by emerging technology are not considered. IT system development generally does not consider analytical needs and opportunities.</p> <p>There is limited access to analytics tools. Most analysis is conducted on spreadsheets after manual extraction.</p>	<p>There is a common infrastructure and central repository for analytics services, but it frequently fails as it is not aligned with other IT systems. Opportunities to improve analytics services through technological development are generally not exploited. Analytical needs and opportunities are sometimes considered in the purchase and development of operational and administrative IT systems but are generally given low priority.</p> <p>Tools are available for joining and visualising data but with limited flexibility and reproducibility.</p>	<p>The common analytics services infrastructure is well designed and maintained. A formal routine for synchronising changes with source systems is in place and catches most changes. The tax administration exploits some of the new opportunities offered by emerging technology. Changes to other IT systems only proceed after consideration of analytical needs and opportunities, but these are not necessarily given high priority.</p> <p>Users have access to a limited range of analytical tools. Where opportunities arise, analytical tools are evaluated against next-best alternatives.</p>	<p>The common analytics services infrastructure incorporates leading architecture solutions like cloud services as appropriate, and is frequently enhanced based on emerging technology. Automated change information flows from source systems to the analytics services infrastructure, ensuring that changes are implemented in time. Analytical needs and opportunities are a significant factor in decisions regarding IT system development.</p> <p>Users have access to a full suite of analytical tools, including tools for network analysis.</p>	<p>The analytics services infrastructure is an integrated part of the wider internal and external network constituting taxpayers' natural systems, executing tax processes and evolving along with the other systems.</p> <p>The administration collaborates with external partners in testing emerging analytics technology.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Data management	<p>A significant number of data sources are not yet digitised. Many of the digitised data sources are maintained in separate systems with no central repository, leading to difficulties with matching and exploration.</p> <p>There is limited awareness of the importance of a common ontology and no common systems or processes are in place for creating and maintaining metadata.</p> <p>The organisation as a whole has little awareness of the importance of data quality. Data documentation is generally limited and of varying quality. The data used for analytics has many missing values and errors.</p>	<p>Most data sources are digitised, and some data is made available in a centralised repository for reporting purposes. Some of the sources share a common taxpayer identifier. A small number of third party data sources are available, but with significant matching and quality issues.</p> <p>The administration is aware of the need for a common ontology where concepts, terms and structures for analytics source systems are described and harmonised, but this has not been consistently implemented. Creation of metadata is inconsistent.</p> <p>There is awareness of the importance of data quality in parts of the organisation, but there is no systematic monitoring of data quality, and error correction is usually carried out manually in an ad hoc manner.</p>	<p>All significant data sources are digitised. A central repository for most data used for analytics, including third party sources, is in place, with acceptable matching levels supported by a secure digital identity shared by all internal sources. Load frequency and preparation levels largely match analyst needs.</p> <p>The administration has implemented a common ontology for core systems. Processes are in place to create and maintain the ontology catalogue, and are largely followed. The ontology catalogue is partially integrated with the central analytics repository and the analytics tools.</p> <p>There is a general understanding of the importance of data quality in parts of the administration. Data quality monitoring is largely automated. Error correction, although well organised, is mostly done manually.</p>	<p>Operational datasets are comprehensively documented. Users have access to a wide range of third-party sources and unstructured data, increasingly in real-time. This is underpinned by the use of digital identity which is shared across society. Some representative datasets are available for development purposes. Load frequency and adaptation levels match analyst needs.</p> <p>Maintenance of the common ontology for most internal systems is largely automated. Integration between the ontology catalogue, the central repository and the analytics tools is improving.</p> <p>Data quality is increasingly an integral part of the overall business strategy. Data quality monitoring and error correction is largely automated.</p>	<p>The comprehensive central analytics repository is increasingly shared with other agencies. Analysts have near-real-time access to data in taxpayer and third-party systems as necessary, and large representative datasets are available for development purposes. Internationally compatible digital identity supports all taxation processes.</p> <p>Maintenance of the common ontology for all internal systems is fully automated, and translation rules exist for all external systems available for analytics. The ontology catalogue is integrated with the central repository and the analytics tools.</p> <p>Data quality is a central part of the overall business strategy, and there is widespread understanding of the importance of this. Data quality monitoring and error correction is fully automated and happens in real-time.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
	<p>Poor data security management is often observed, increasing the risk of data leaks or the alteration of data.</p>	<p>Some security measures are in place, and it is generally possible to trace access and changes to data to identified individuals. However, unauthorised transfer of data (for example to an external drive) is not automatically prevented or detected.</p>	<p>The data security solution ensures individual approval-based access as well as adherence to privacy laws. Disclosure standards, regulations and policies are being established to ensure that security and data risks are well-managed and allow for timely detection of data breach incidents or any cybersecurity threats</p>	<p>The fine-grained data security solution allows for flexible and secure sharing of data between analysts. Where access to or use of data goes beyond permissions, this is flagged in real-time as a potential breach and integrity risk to management and data protection officers.</p>	<p>There is real time management of data protection risks through AI applications which ensure that data cannot be accessed or used without appropriate permission and which automatically restrict access to data and issue real-time reports to management when potential misuse of data is identified.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Talent management	<p>Dedicated analyst positions are sometimes advertised, but recruitment requirements generally only include basic analytical skills, and systematic steps are taken to improve the analytical capability of the administration or to promote career opportunities for analysts.</p> <p>Analytics training is generally done through mentoring and self-learning. While analysts may be sent on ad hoc training by individual business units, the formal identification of skills gaps and programme to upskill analysts is inadequate or missing.</p>	<p>The core competencies needed for analyst positions have been identified, and recruitment is increasingly tailored towards improving the analytics capability of the administration. However, the career path for analysts is unclear, making it difficult to retain highly skilled analysts.</p> <p>Limited training is available to fill analysts' skills gaps, although upskilling is encouraged by management. Informal networks for analysts are encouraged.</p>	<p>Analysts are generally recruited through a dedicated process (which may be shared with other government agencies), and there is a proactive advertising strategy. Analytical capabilities are given increasing weight in recruitment where relevant.</p> <p>Formal training opportunities for analysts are offered, and analysts are encouraged to undertake training opportunities. The analytics services governance team organises networks for analysts, increasing cross-unit exchange of analytics skills and experience.</p>	<p>The administration has developed a reputation as a popular employer of analysts, and career paths are defined in relevant business units. Links have been established with some universities and similar bodies, and there is a good understanding within HR of skills needed for analysts.</p> <p>There is structured training in place for analysts, and staff are encouraged to undertake self-guided learning on the latest technologies and tools. There is some support for external advanced courses and a management culture supportive of continuous learning and development.</p>	<p>The administration is recognised as a leading employer of analysts and provides strong career opportunities with staff able to progress to management levels. There is a close relationship with universities and similar bodies to provide a pathway to a career in public service.</p> <p>Opportunities are routinely available for analysts to undertake professional courses and for continuous multifaceted learning, including in other business areas.</p>
Business feedback and evaluation	<p>Analytics outputs are occasionally subject to evaluation. When feedback is sought from users, it happens on <i>ad hoc</i> and informal basis rather than through formal mechanisms, meaning that learning is often not captured and applied to future projects.</p>	<p>Analytics outputs are subject to evaluation after completion, although not consistently. Users provide formal requirements at the outset of a project. Formal feedback is provided by users, although the feedback may not always be captured and applied to improve future projects.</p>	<p>Analytics outputs are tested and reviewed by users as they are developed. Feedback is treated as a key part of delivery of a project. Learnings are generally agreed through the governance processes and applied to improve future projects.</p>	<p>Analytics outputs are tested and evaluated according to pre-defined protocols on a regular basis. Users provide timely, thorough, and structured quantitative and qualitative feedback for each project, and results are consistently used to improve future projects. Some analytical work is subject to expert external review.</p>	<p>AI is used to separate the impact of analytics from the effects of other factors. Analytical models are monitored on a continuous real-time basis, and recommendations for adjustments are made where appropriate.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
Analytics process and project management	<p>Each piece of analytical work follows a different approach according to analyst experience and capabilities, with few formal processes in place.</p> <p>Analytics projects are usually carried out by analysts and often do not involve the business side, although there may be some informal engagement. Follow-through to ensure appropriate changes in work processes and procedures is often inconsistent.</p>	<p>Although some work is agreed with operational users, analytics projects are often undertaken without ongoing business engagement due to limited resources and capabilities.</p> <p>Selected aspects of project management are followed in some analytics projects.</p>	<p>Operational users are involved in the project, but often see their role as reactive rather than pro-active.</p> <p>Standardised processes are in place covering business engagement and collaboration, project management, and testing. Projects follow a mix of waterfall and agile methodologies. High-level programming standards are in place.</p>	<p>Operational users are fully involved at all stages of the advanced analytics project, suggesting new ideas and ensuring that what is delivered meets real operational needs.</p> <p>Principles-based approaches are in place for all aspects of analytical work, and analysts have the experience and know-how to tailor the application of these principles as required. Projects follow an agile or similar iterative and flexible methodology where applicable.</p>	<p>Operational users, dedicated project management experts and analysts work as a single team.</p> <p>Rigorous processes are in place covering the full suite of analytics applications, including AI, natural-language programming, real-time deployment, etc. The end-to-end process for analytical projects is subject to regular external peer review and validation as well as appropriate benchmarking with leading external organisations.</p>
Analytics capabilities	<p>Most work is based on hypothesis-driven data analysis, making the assumptions on which the analysis is based limit the scope and potential results of the analysis, and potentially allowing for incorrect or inaccurate conclusions.</p>	<p>Work is a mixture of hypothesis-driven analysis, data exploration and basic modelling, allowing analysts to increasingly uncover unexpected or previously unknown patterns.</p>	<p>Most work is based on data exploration and modelling using a variety of statistical techniques; analysts carry out systematic tests of code and data accuracy. Cross-validation or similar methods are used to test the reliability of findings.</p>	<p>Analysts use a mix of structured and unstructured data, as well as big data, and exploit a wide range of statistical techniques, including increasing use of machine learning and other variations of artificial intelligence.</p>	<p>Analysts utilise a full suite of data visualisation, natural language processing, machine-learning and other variations of artificial intelligence tools. Substantial parts of the process are automated.</p>

MATURITY LEVELS	EMERGING	PROGRESSING	ESTABLISHED	LEADING	ASPIRATIONAL
	Analysts mainly rely on basic data manipulation and visualisation skills, whereas statistical methodology and advanced modelling techniques are largely untouched, limiting the potential for new insight.	Advanced analysts have some modelling skills and a basic understanding of the wider tax system, affording them basic insight in how their work can add value to the administration's work.	Advanced analysts have a good command of statistical thinking and some key modelling techniques in addition to strong capabilities in data manipulation and visualisation. They have a good appreciation of how they can support business decisions in general.	Advanced analysts have developed strong statistical thinking skills, are comfortable using a broad range of modelling techniques, are developing graph analytics skills, and are highly skilled in creating visualisations both to explore data and present insights. They work cooperatively and proactively with operational managers to identify business problems and design and communicate practical solutions.	All advanced analysts have a thorough understanding of the statistical theory of and mechanics of a wide range of advanced techniques, including AI, natural language processing, and advanced graph analysis. They are highly skilled in the effective application of statistical techniques to frame and to answer business problems, and have a deep understanding of business strategy and operational challenges.
Usage areas	Analytics usage areas are limited and only partially adaptable to the changing tax administration environment.	While somewhat patchy across the administration, in some units professional data analysts are using combinations of data sources to support the tax administration mandate, for instance by assessing taxpayer risk profiles for auditing and uncovering major anomalies.	Sophisticated data analysis enables the administration to detect anomalies, risks and potential underlying problems with tax law, with an increasing use of automation to flag issues for further investigation.	Analytics are built into a wide range of business processes within the tax administration, increasingly supported by AI applications, allowing the administration to identify issues and to take automatic actions (such as taxpayer prompts) or make recommendations for actions by tax officials.	Data analytics has become an integrated part of taxpayer natural systems, simplifying compliance and reducing cost for the tax administration and taxpayers.

5 Glossary of terms

Advanced technology: It will vary over time and with context what is considered advanced technology; at the time of publishing and in the context of tax administration analytics, machine learning and other forms of artificial intelligence are likely to be considered advanced.

Agile project methodology: A methodology, often based on the Agile Manifesto³, which amongst other differences from traditional methodology focuses more on responding to the need for change than on following a predefined plan.

Advanced analyst: A person using advanced analytics in a professional capacity.

Advanced analytics: Analysing data using statistical techniques and practices to gain understanding and insight, make predictions and draw inferences about cause and effect.

Analyst: A person using analytics in a professional capacity.

Analytics: Discovery, interpretation and communication of meaningful patterns in data. This includes reporting, risk modelling, advanced analytics and other variations of using data to gain insight. All variations of analytics depend on the Analytics services made available by the tax administration to its staff.

Analytics outputs: Results from analytics work. These can vary as much as the field itself; examples include a dashboard and a risk rating for a taxpayer. Users of analytics outputs can evaluate and give feedback to the analyst regarding the usefulness of the outputs.

Analytics services infrastructure: Computing infrastructure, software and data used for analytics. The data is often prepared to be more immediately usable.

Analytics services: The combination of an analytics services infrastructure, analytics management, analytics prioritisation procedures and analytics support personnel in IT and business making it possible for analysts to perform their work effectively and efficiently.

Analytics services governance: Managing analytics services in order to maximise the benefits and balance the needs of the different teams using analytics services.

Artificial intelligence (AI): The ability of computers to acquire and apply knowledge, including by performing tasks like sensing, pattern recognition, learning, and decision making. Machine learning is a sub-category of AI where the algorithms used may be changed by the computer. Natural language processing is a branch of AI seeking to enable computers to process and interpret human language in a similar manner to what humans can do.

Big Data: The term is usually used about data sets that are too large or complex to be processed with traditional methods and tools. Many use the V-s to describe Big Data sets:

- Volume: The amount of data is much larger than usual
- Velocity: The rate at which the data is produced or received is much faster than usual.
- Variety: The data sets contain data on a variety of formats, like audio, video streams and images.

³ <http://agilemanifesto.org/>

- **Veracity:** The possibility to verify that data is correct may vary considerably or be quite low.

Business units: The parts of a tax administration where operational tasks such as compliance interventions, customer service, or debt management interventions are carried out. The structure and responsibility of the business units will vary according to local arrangements.

Champion/ Challenger concept: This concept is based on identifying the current approach as the Champion, and developing a set of Challenger approaches that differ from the Champion in measurable and defined ways, so that they will deliver different results. Testing the approaches with real transactions will show if any of the Challengers give better results than the Champion does.⁴

Cross-validation: Validating the accuracy of a finding with different sets of data.

Data literacy: This can be understood as the ability to use and understand the usefulness of data.

Data mining: This term is often used about the process of searching for patterns in large data sets.

Fine-grained data security: Data security measures that regulate access to individual data sets or parts of these. For instance, one user may have access to the entire data set while another user only has access to particular columns or rows in the data set.

Machine learning: See Artificial Intelligence.

Metadata: Information about data elements. The metadata may for instance include structural information like data type and number of records; quality information like validation rules, data quality and data density⁵; and relational information like possible integration with data in other systems.

Modelling: Administrations use this term in different ways, but generally modelling in tax analytics involves using software to create a mathematical or other form of model that represents an aspect of reality and can be used to answer questions, test concepts or uncover new information.

Natural language processing: See Artificial Intelligence.

Ontology: Overview of common concepts, terms and structures (i.e. metadata) used in the tax administration. For instance, officials and IT systems in the tax administration should use a single definition of taxpayer; this would be defined in the ontology.

Operational manager: Any manager with responsibility for operations (e.g. compliance management, debt management, customer service).

Operational user: In this context, a user that utilises the results of analytics for operational purposes. For instance, an auditor may perform an audit on a company because analytics results show a high risk of fraud.

Regular: In the context of activities performed, this means that the activity is planned and happens repeatedly at some predefined interval, as opposed to ad hoc activities.

Seamless tax administration: A tax administration that ensures that taxation happens in the background in seamless and frictionless processes, with little or no effort on the part of the taxpayer.⁶

⁴ Definition loosely based on <https://www.fico.com/blogs/adaptive-control-championchallenger>

⁵ Data density describes if a field in a record is hardly ever, sometimes or almost always filled out. For instance, having a field for business category in the record describing a business is only useful for analysis if it almost always contains a value.

⁶ Definition loosely based on <https://www.oecd.org/tax/forum-on-tax-administration/publications-and-products/tax-administration-3-0-the-digital-transformation-of-tax-administration.htm>

Senior management: Different administrations use different terminology, but this should generally be taken to mean Commissioner, Assistant Commissioner, Head of Division, Head of Branch and similar positions as well as their immediate subordinate managers.

Taxpayer natural systems: These are sometimes called ecosystems; they are the interconnected systems that taxpayers use to run their businesses, undertake transactions and communicate, including for instance business accounting systems, financial service systems, and sharing and gig economy platforms.

Unstructured data: Data which is not structured in a predefined manner. Examples include image files, audio files, video files and text files.

Waterfall project methodology: The name of the methodology comes from the fact that when a project phase has been completed, it cannot be revisited; water only falls down. With waterfall development, the user representative normally signs off on a set of requirements for the software that is to be developed. The developers then design, develop and test the software internally in their organisation as they interpret it to be described in the requirements. Then the users test that the software fulfils the agreed requirements, after which the software goes into production. Any need for changes that arise during the design, development and testing will have to be handled through a formal change request with corresponding budgetary adjustment (usually increase).

Annex A. Self-assessment record sheet

Please only include one “X” per row in the self-assessment record – the one that best fits your administration’s level of maturity.

Please send the completed self-assessment record sheet to the Forum on Tax Administration Secretariat at fta@oecd.org.

Process-related questions

Please see Recommendations for the self-assessment process for more information.

Jurisdiction name	
Contact person	
Appointment of facilitator (Y/N)?	
Number of staff working with analytics or analytics services in the self-assessment group	
Appropriate range of staff involved in the discussions (Y/N)?	
Involvement of official(s) from other areas of the tax administration (Y/N)? Please comment.	
Time taken in hours to complete the self-assessment	

Self-assessment record

Strategic perspective

Indicative attribute \ Maturity levels	Emerging	Progressing	Established	Leading	Aspirational
Strategy					
Governance					
Culture					
Budget setting					

Operational perspective

Indicative attribute \ Maturity levels	Emerging	Progressing	Established	Leading	Aspirational
IT infrastructure, system development and tools					
Data management					
Talent management					
Business feedback and evaluation					
Analytics process and project management					
Analytics capabilities					
Usage areas					

Additional considerations

1. Are there particular elements within one or more indicative attributes where you assess your administration to be substantially more or less mature compared with your overall assessment for the attribute?
2. Are there areas where you think there is a lack of clarity as regards the difference between adjacent maturity levels?
3. Are there areas where you think the language is unclear or ambiguous?
4. Would you like to suggest additional terms to include in the Glossary?

OECD Tax Administration Maturity Model Series

Analytics Maturity Model

The OECD Tax Administration Maturity Model Series sets out descriptions of capabilities and performance in particular functions or sets of activities carried out by tax administrations across five discrete maturity levels. The intention of this series is to provide tax administrations globally with a tool to allow them to self-assess their current level of maturity and to facilitate consideration of future strategy, depending on a tax administration's unique circumstances and priorities.

Analytics is increasingly becoming a common and integrated part of tax administrations across the world, in developed and developing countries alike, being used in strategic as well as operative usage areas. The FTA Analytics Community of Interest and the FTA Secretariat have therefore developed the *Analytics Maturity Model*. The model can aid tax administrations in assessing their analytics usage and capability, providing insight into current status and identifying areas of weaknesses as well as strengths.

The model is organised around the strategic and operational perspectives of analytics. To assist in the understanding of what a given level of maturity means, a set of indicative attributes is contained under each maturity level. In addition to the model itself, the report offers guidance for how to perform a self-assessment based on the model. It also summarises the anonymised results from the over forty administrations that have participated in the piloting process, as an aid to understanding the current status of analytics use and capabilities in tax administrations.