

THE ABS STATISTICAL CAPABILITY FRAMEWORK – THE FIRST STEP IN TRANSFORMING THE STATISTICAL CAPABILITY LEARNING ENVIRONMENT

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The experiences of the Australian Bureau of Statistics (ABS) are discussed in relation to the learning transformation underway to realise the vision of a more statistically capable ABS, society and region. The newly developed Statistical Capability Framework underpins the development of relevant learning pathways and guides the development of flexible learning options that are not constrained by geography. By leveraging strategic partnerships, existing resources and available technologies, “just for me” learning experiences are being created. The ABS is moving away from the current people-intensive learning environment to a model which can massively increase the level of statistical capability by making statistical capability development experiences more accessible and relevant to the individual, no matter where they are located or which target group they are from.

THE ABS AND STATISTICAL CAPABILITY DEVELOPMENT

As Australia’s national statistics office the Australian Bureau of Statistics (ABS) has, as part of its corporate role, a commitment to “build strong statistical capacity and capability domestically and within the Asia-Pacific region” [ABS, 2012].

In 2013, the ABS released its Statistical Capability Plan 2014-19. The Plan is an internal high level blueprint to provide direction to ABS efforts to build statistical capability and to facilitate a more collaborative and integrated approach. A key driver for the ABS approach relates to creating a more efficient and effective learning environment, which is flexible and responsive to individual needs and can bring about demonstrable change in the level of statistical capability across target groups.

Delivery of the Plan will ensure ABS has the statistical skills needed for the future and will ensure our national and regional stakeholders can “build their skills to effectively collect, use, manage and communicate statistical information” [ABS 2013].

A key strategy of the ABS Statistical Capability Plan is to transform the delivery model for statistical capability development. This can be achieved through strategic partnership with other key organisations so better learning pathways can be developed and delivery methods can be scaled to reach more people in an effective and sustainable manner.

ABS outreach initiatives form an important part of the overall statistical skills development strategy. A focus on strategic partnerships has included raising statistical awareness and basic skills of Australia’s Indigenous youth through the use of Indigenous engagement managers, as part of the ABS Indigenous Reconciliation Action Plan, 2013-16 [ABS, 2013], and the placement of experienced ABS staff in government departments to support statistical needs analysis activities and capability development.

In relation to Indigenous engagement outreach efforts, the role of the manager is to visit Indigenous communities (often in rural and remote locations) to raise awareness about the role of the ABS and the value of data, seek their participation in ABS data collections, assist in returning data back to the communities, and provide some basic statistical literacy training.

THE NEED FOR A TRANSFORMATION

Despite the successes around raising statistical capability that have been achieved to date, the rapid growth in the complexity of problems and new opportunities with data is leading to an increasing gap in the skills available to meet these demands. This growth in demand for statistical capability coupled with constrained resource availability within the ABS to meet the demand has led the ABS to rethink its approach to statistical capability development.

To date, there has generally been a reliance on people-intensive methods by the ABS to provide face-to-face training and support to government, business and the wider community. Continuing with such an approach is not sustainable due to the increasing level of resources that would be required to meet the ever increasing need. Notwithstanding the issue of resource constraints, from the perspective of effectiveness of effort, the people-intensive approach has not achieved the desired outcomes for various target groups due to barriers such as limited geographic reach, inflexibility of the scheduled course timing and content, or cost of access.

ABS resources, made freely available online, have often been developed as discrete learning offerings that have little or no relationship to other available resources. They have also not kept pace with the changing expectations of learners in terms of how they access and engage with the learning process. As such, and due to resource constraints, these offerings will now remain static.

Outreach initiatives have also been hampered by the reliance on people-intensive methods, along with a lack of clearly identified learning pathways that could support the existing outreach initiatives.

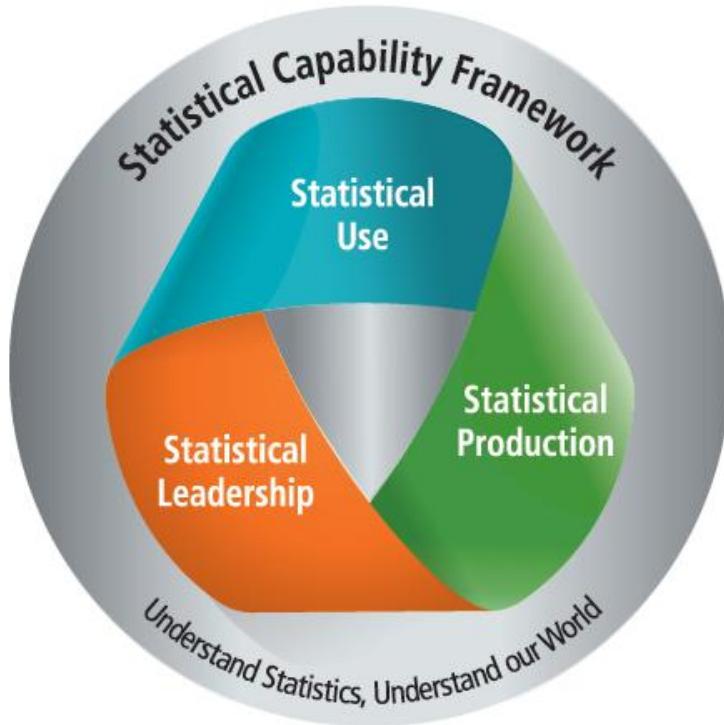
THE TRANSFORMATION

To bring about a demonstrable difference to the level of statistical literacy/capability across the various target groups, the ABS has commenced a transformation process to more effectively and sustainably achieve the vision of a statistically capable workforce, society and region. The objective of the transformation process is to create a learning environment that is scalable, flexible and relevant to the needs of those who will benefit from having the ability to understand data. The transformation is based around the following elements:

Creating a Common Language – the Statistical Capability Framework

Putting in place a common understanding of what it means for someone to be statistically capable was the first step in the transformation process. In the absence of any internationally agreed framework, the ABS has developed a Statistical Capability Framework that describes the high capability level dimensions (Tier 1 – refer Figure 1), related activities and required specific skills and knowledge. [Tiers 2 and 3 - refer Attachment 1]. The Framework will be used to review the ABS Statistical Skills for Official Statisticians resources, 2012.

Figure 1: Statistical Capability Framework – Tier 1



Against each of the high-level dimensions are a set of statistical activities (tier 2) associated with being able to use data effectively, produce statistical outputs that are fit for purpose, and lead a statistical system. The activities are described in a manner which is intended to allow a wide range of the target audience to easily associate themselves with.

The third tier of the Framework describes the specific skills and knowledge required to be able to undertake each of the statistical activities. The work associated with researching and articulating this third tier has only just been completed with the third tier only recently released as draft for wider consultation.

An objective for ABS in developing the Statistical Capability Framework was to create a framework that is relevant not only to those who work in national statistics offices but also to those who work in all sectors of the national and international communities.

The ABS hopes that the release of this early version of the framework and the discussion of this paper will contribute to commencing an international dialogue about the composition, rationale and benefits of having a statistical capability framework as an endorsed and supported international standard.

The benefits of adopting the Framework as an international standard are associated with allowing for a more informed understanding of where existing statistical learning resources could support the development of statistical capability, the identification of priority statistical learning resource gaps, and the creation of statistical learning resources that can be more readily shared internationally.

An important part of strengthening the ABS' own overall statistical capability is the *Statistical Skills for Official Statisticians* resource which is aligned to the ABS Statistical Capability Framework.

Learning Pathways

Integral to the transformation process will be the availability of predefined learning pathways, as well as the ability to create user-defined (bespoke) pathways, which are aligned with the Statistical Capability Framework. The mapping of ABS and non-ABS learning options to the Framework, and addressing priority learning resource gaps, will need to be undertaken to support the learning pathways creation process.

Given the need for the ABS to support statistical capability development across a wide spectrum of people located across the nation and in the region, the ABS has developed an online interface, known as the Learning Hub, by which an individual can see what is meant by statistical capability (i.e. the components of the Framework), select those areas of relevance to their own circumstances via the interface, and be able to access the learning options that will assist in meeting their unique needs (either via a predefined pathway or a user-defined pathway).

Flipping the Classroom

The ABS is moving towards a learning environment that is characterised by the use of freely available online ABS and non-ABS resources that can be used to build basic levels of statistical literacy and other statistical capabilities (i.e. to provide the fundamental concepts and theory), and a blended learning approach to build applied skills. The intention with the new environment is to have learning options that range from short standalone online modules that cover basic level theory or concepts through to more formal (and potentially accredited) e- or blended learning offerings.

Future ABS involvement in any face-to-face learning delivery will focus on applied learning and be based on the flipped classroom approach, with the concepts and theory available via eLearning prior to ‘classroom’ based sessions with an experienced ABS facilitator [see Brame (2014) for further information about flipping the classroom]. Applied learning sessions will primarily be on a user-pays basis.

Redevelopment and Re-Use

Existing ABS face-to-face training courses are in the process of being redesigned to enable them to be delivered as a series of modularised eLearning or blended learning options. The adoption of a ‘create once, use many times’ approach forms the basis for future ABS learning resources development. As the capacity of the ABS is limited in relation to developing new learning content, the main opportunity to support the development of statistical capability will come from linking skill requirements to the freely available online resources from the wide range of global providers. These include statistics courses from Massive Online Open Courses (MOOCs) providers such as, but not limited to, Coursera and Udacity, statistics resources from sites such as GapMinder, Khan Academy, and resource materials from other national statistics offices, the United Nations and its affiliates, and other private or government funded institutions.

Quality Assurance

In the pursuit of a more effective learning environment, a challenge for the ABS is the need to ensure the quality of its products and services. With the learning pathways interface that links people to non-ABS learning offerings (the Learning Hub), there will need to be a set of criteria to ensure resources meet a strict quality framework.

It is not feasible for the ABS to identify and evaluate all individual statistics learning resources, therefore the criteria will initially be focussed on the ‘credibility’ of the source. For those sources that are seen as being ‘credible’, the ABS is undertaking further evaluation of which offerings are related to developing statistical capability so as to assist with the mapping process. It is expected that many of the ABS and non-ABS resources that would be linked to the interface would be most relevant to basic or intermediate level needs. In relation to advanced statistical analytical skills,

people would be required to identify specialist providers such as universities and seek out information about learning options that best suit their needs.

One of the challenges in adopting a learning delivery model that directs people to non-ABS resources is the loss of direct control over the content and ongoing availability of such resources. This will require a strategy to be adopted which does not require each individual offering from a MOOC or other source to be identified and listed; a more pragmatic approach will be needed to ensure the interface remains current, relevant, and is sustainable in terms of the ABS effort required to support it.

Importance of Collaboration

As a national statistics office (NSO), the ABS possesses extensive experience and knowledge in relation to leading a statistical system, statistical frameworks and concepts, data collection and communication, and knowledge of how statistical outputs are used. However, in relation to developing and delivering adult learning the ABS will need access to enabling infrastructure and expertise that will facilitate the successful implementation of a scalable and responsive learning environment.

In addition to the strategic partnerships already in place, the identification of suitable collaborative arrangements, such as with those tertiary institutions with a proven track record in the provision of online learning delivery, is a current focus for the ABS.

In relation to the ABS working with other statistics offices, the use of a common framework will also enable resources to be shared across countries. This reduces the burden on each NSO whilst also increasing the opportunities for collaboration activities associated with supporting the development of relevant and accessible learning resources that can build statistical skills.

A Receptive Learning Environment

Facilitating access to information about what skills are needed to be statistically capable, and the available learning options to develop these skills, is only a part of the transformation process that is underway. A complementary challenge for the ABS is to promote a culture where the acquisition of statistical skills is valued, pursued and applied. Understanding what is important to an individual, and leveraging that interest, form part of a wider suite of strategies to create a receptive learning environment.

To build and sustain into the future, the ABS focus is on influencing peak sector bodies so that they better understand the value of being statistically capable, and encourage these groups to promote this message as part of the resources that they make available to their constituents.

CONCLUSION

Continuing to support the building of statistical capability through people-intensive means was not sustainable, nor desirable. For the ABS to be able to effectively address the ever increasing need for statistical skills, a fundamental transformation to the way the ABS supports statistical capability development was needed.

ABS efforts to create an effective learning environment that will lead to a demonstrable increase in the level of statistical capability in the community are now focussed on achieving the following:

- The adoption of a common language (Statistical Capability Framework)
- A learning environment that is scalable, flexible and efficient

- Availability of predefined and bespoke learning pathways mapped to the Statistical Capability Framework
- The acquisition and application of statistical capability is valued and actively pursued
- Online and blended learning approaches are utilised, making use of freely available resources
- Flipped classroom approach for applied learning
- Greater use of collaboration and social learning.

To achieve the objective of the ABS being able to support national and regional stakeholders build their skills to effectively collect, manage, use and communicate statistical information, the ABS will also need to learn from and collaborate with others who are active in the statistical learning space.

REFERENCES

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Attachment 1

Statistical Capability Framework (Version 2.0) – Tier 2 and Tier 3

Statistical Capability Dimension	Statistical Capability Framework - Tier 2
	This level outlines the main steps or processes required to undertake work in the areas outlined in Tier 1.
Statistical Use	Discovering & Assessing - finding sources of statistical information that can help you better understand the issue being studied, and determining whether that information can appropriately inform your analysis/statistical need.
	Analysing and Interpreting - using appropriate statistical techniques to find key messages in the data that will help to inform your analysis/statistical need.
	Communicating - presenting the key messages you have found in the data in a clear and accurate manner. This includes articulating the purpose of your analysis/statistical need and any quality issues or limitations you may have found in the data.
	Applying - using the statistical information that has been discovered, assessed, analysed, and interpreted for the purpose/s outlined at the beginning of the process.
Statistical Production	Specifying - articulating the statistical need in detail. Scoping what information is required to address that need and how it will be collected and quality assured.
	Designing and Building - designing and building the statistical methodologies, IT systems, and business processes that will be used to produce the required statistical information.
	Collecting and Processing - undertaking the actual collection and processing of the required data. This includes documenting associated metadata and assessing data quality at all stages of collection and processing.
	Validating and Disseminating - preparing the data outputs for publishing. It involves validating the accuracy of data outputs, ensuring any privacy requirements are adhered to, and statistical outputs are accessible by all relevant stakeholders.
	Evaluating - undertaking an evaluation of the statistical production process to consider if it was successful, how it may be improved, and/or whether it should be undertaken again.
Statistical Leadership	Positioning - ensuring the ongoing relevance of statistical information by understanding the broader policy or operating environment and identifying emerging statistical needs and their solutions.
	Influencing - shaping the environment in which statistical information and assets are valued.
	Enabling - ensuring the appropriate foundations and infrastructure are in place to support the generation, management, availability, and use of high quality statistical information.

Statistical Capability Dimension	Statistical Capability Framework - Tier 3 – Statistical Use This level outlines the skills required to undertake work in the areas outlined in Tier 1 and 2.
Statistical Use	<p>Discovering & Assessing</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> ● articulate the data need in specific terms. ● formulate research questions based on the data need. ● locate and access relevant data sources. ● assess the quality of available data sources and determine if they are fit for the users' purpose. ● compare quality attributes for different data sources in the context of the data need. ● negotiate access to data sources that require payment, formal agreement, or have other accessibility requirements. <p>Analysing and Interpreting</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> ● understand and apply appropriate statistical techniques to extract relevant information from data. ● identify the main contributors, relationships, and trends in data. ● transform data into tabular or graphical format. ● understand how the quality of data can affect interpretation. ● reach a conclusion or prediction based on the extracted information. <p>Communicating</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> ● describe key statistical information in both written and visual format. ● relate key messages to the issue under consideration. ● apply statistical reasoning to support your conclusions/decisions. ● clearly articulate the limits of the data due to quality. ● communicate technical issues to non-technical stakeholders. <p>Applying</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> ● develop risk mitigation strategies based on data gaps, or quality issues identified in the analysis. ● communicate the decision to be made and/or recommendations to be implemented, including the relevant statistical justification.

Statistical Capability Dimension	Statistical Capability Framework - Tier 3 – Statistical Production This level outlines the skills required to undertake work in the areas outlined in Tier 1 and 2.
Statistical Production	<p>Specifying</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • engage and partner with relevant stakeholders to understand the research and policy aims of key data users, the concepts to be measured, and the ways the outputs will be used. • determine if a statistical project is necessary and feasible. • develop a collection strategy, prioritise content, establish methodological and quality parameters, and agree on a dissemination strategy. • apply knowledge of statistical business processes, methodologies, and technologies to ensure fit for purpose outputs. • conduct quality assessments on datasets derived from administrative sources. • identify potential quality issues and articulate any impacts on the collection process.
	<p>Designing and Building</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • develop a sampling strategy (e.g stratification, frame, coverage, and scope of collection). • design and build collection content (i.e. questions, data items, variable descriptions). • design, build, and test a collection instrument. • develop an editing strategy (e.g. micro- and macro-editing, editing methods and techniques). • develop an imputation strategy (e.g. identifying data items to impute, imputation methods). • develop a data quality strategy (e.g. quality gates). • define and document relevant metadata. • design and test training materials and instructions for the statistical collection. • build and test statistical processing systems.
	<p>Collecting and Processing</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • initiate contact with providers and collect data using relevant collection methods. • extract datasets, assess data quality, and apply appropriate data pre-processing tasks. • apply micro- and macro-editing techniques to data to identify potential errors. • identify and resolve inconsistencies between datasets before linkage/integration. • apply data linking techniques, routines, and methodology to datasets being linked. • derive new data items from existing variables. • apply weighting criteria to sample data to create estimates for the target population.
	<p>Analysing and Disseminating</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • identify key issues in the data and dissect or isolate its components to investigate further. • apply analytical techniques to view data from a range of perspectives and/or detect and test relationships between variables. • explain movements in key variables over time and between different subgroups. • confront key statistics with other data sources and explain any differences. • articulate any associated data limitations (i.e. sampling and non-sampling errors, data gaps). • create summary indicators to communicate the statistical stories present in the data. • transform output datasets, commentary, and statistics into dissemination formats.
	<p>Evaluating</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • document and assess all relevant information relating to the quality of the data collection. • use metadata to support the evaluation of systems, processes, and procedures. • identify key statistical issues in the collection process and potential impacts on data quality.

Statistical Capability Dimension	Statistical Capability Framework - Tier 3 – Statistical Leadership This level outlines the skills required to undertake work in the areas outlined in Tier 1 and 2.
Statistical Leadership	<p>Positioning</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • undertake an environmental scan to understand the broader policy or authoring environment. • apply economic, environmental, or social knowledge to manage, implement, and innovate within the statistical system. • conduct statistical work aligned to the Fundamental Principles of Official Statistics (set out by the United Nations).
	<p>Influencing</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • participate in and contribute to networks, seminars, and groups of experts involved in statistical activities. • establish and maintain good working relationships with key stakeholders in particular statistical fields. • develop and promote the use of national and international statistical standards, classifications, frameworks, and protocols. • promote data access and facilitate data sharing across relevant statistical and government agencies and organisations. • negotiate agreements on the provision of data (including administrative data) and technical services to agreed timetables and budgets.
	<p>Enabling</p> <p><i>Skills required:</i></p> <ul style="list-style-type: none"> • establish, maintain, and leverage stakeholder relationships. • develop and enhance relevant statistical networks. • ensure stakeholders know what data is available, understand relevant statistical concepts and simple statistical analyses, and can communicate statistical information effectively. • assess and actively develop the statistical capability of users and producers of statistics. • facilitate the delivery of important national and international statistics to users along with related information to help them understand and apply the data effectively.