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VALUING NEW ZEALAND'S DIGITAL ECONOMY

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This document has been prepared by Jonathan Millar and Hamish Grant - Statistics New Zealand and will be presented under item 11 of the draft agenda

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VALUING NEW ZEALAND'S DIGITAL ECONOMY

1. Executive Summary

The estimates of New Zealand's digital economy presented in this paper approach the valuation of New Zealand's digital economy from a macro-economic standpoint through the use of the supply-use tables. By design we do not make any changes to the production boundary as we are assessing products which are already included within the production boundary and GDP.

We also briefly outline other areas of work with a digital economy focus across Stats NZ, including the redevelopment of the Information Communications Technology (ICT) Supply survey, the additions of ride and accommodation sharing to the Consumer Price Index (CPI) basket, and New Zealand's Digital Nation Domain Plan.

This paper is a practical attempt at using the framework first presented in the paper *Measuring Digital Trade: Towards a Conceptual Framework (2017)*¹, in particular the 'Nature' component of the framework to identify 'digital' transactions in our National Accounts Commodity Classification (NA06CC) and the Australian and New Zealand Industrial Sector Classification 2006 (ANZSIC06).

The main finding from this paper is that the 'digitally ordered' and 'digitally delivered' aspects of the framework were able to be broadly applied to the current National Accounts estimates. However, the significant material assumptions and the broad nature of our product classification at the aggregate level meant our estimates were not of high quality.

Using the same methods as were used for estimating 'digitally ordered' and 'digitally delivered', data available at the aggregate level was not detailed enough to form an estimate of 'platform enabled' production to any degree of usefulness.

These findings were largely restricted by the level of detail available in our National Accounts data. We found the classification of products to each of the three, 'delivered', 'ordered', and 'enabled' dimensions subjective at times. Consequently we make several assumptions around what is 'digitally ordered' and 'digitally delivered' production.

The values represented in this paper are mostly likely higher than we would expect to see in more granular data with figures designed only to illustrate what can be done.

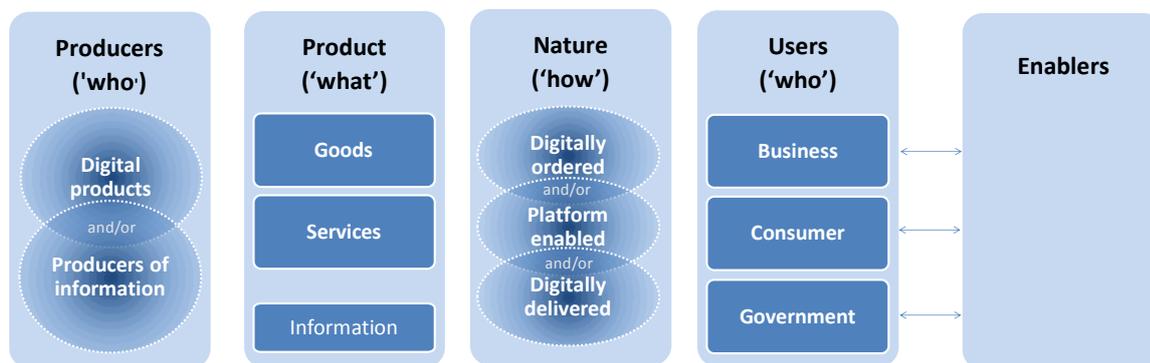
Our estimates of the value of New Zealand's gross output that can be delivered digitally is NZD\$27.9bn (USD 20.9bn)² for the year end March 2015. Our estimates of digitally ordered gross output was NZD\$109.2b (USD81.8bn) for the same period.

2. Background

This paper discusses an attempted application of parts of the framework first proposed in the paper *Measuring Digital Trade: Towards a Conceptual Framework (2017)*. It is assumed that readers are familiar with the framework and the work previously done by the OECD Informal Advisory Group on Measuring GDP in a Digital Economy. The expanded framework is pictured below.

¹ OECD (2017), *Measuring Digital Trade: Towards a Conceptual Framework*, STD/CSSP/WPTGS(2017)3.

² Exchange rates used are as of March 31 2015 <https://www.rbnz.govt.nz/statistics/b1>



3

Definitions of concepts such as ‘digitally ordered’, ‘platform enabled’, and ‘digitally delivered’ are taken from the aforementioned paper: Measuring Digital Trade. The definitions for these concepts and others mentioned in this paper are available in appendix 4.

The digital economy is a growing area of interest for Stats NZ customers like the OECD, Government departments, and the private sector. The appetite for the measurement of New Zealand’s digital economy is driven by the desire to improve the understanding of its role within New Zealand’s economic and social context.

Stats NZ has been working with the Ministry of Innovation and Employment (MBIE) on developing a ‘Digital Domain Plan’⁴. This project is focused on how New Zealanders, businesses and the public sector use digital technologies and will formalise questions of common interest across government to support better management of the digital economy. This initial scoping will be used to guide New Zealand’s approach to measurement of the digital economy.

Stats NZ continues to conduct research on the digital economy. Two particular areas mentioned here are on the consumer price index (CPI) and National Accounts. Investigations within National Accounts have been ad hoc and mainly in response to OECD requests. This paper is our first attempt at measuring the digital economy from a high level macro-economic perspective. The CPI instead often focuses on an individual enterprise or transaction basis due to transactions being representative of a larger group via weighting.

3. Applying the Framework

Methodology

The framework first proposed in the paper Measuring Digital Trade: Towards a Conceptual Framework and since adapted by the OECD Informal Advisory Group on Measuring GDP in a Digital Economy, has been used to compile initial estimates of gross output from the digital economy in New Zealand. The approach has been to classify products to ‘digitally ordered’, ‘platform enabled’, and ‘digitally delivered’.

³ Erich Strassner and the OECD Informal Advisory Group on Measuring GDP in a Digital Economy Second Digital Economy Questionnaire

⁴ More information on the Digital Domain Plan is available here: <http://www.mbie.govt.nz/info-services/science-innovation/digital-economy>

The analytical interest in these estimates may be in understanding the extent to which a digital element is present in economic production. For the most part, the value for each product included represent the full value of production in the economy for that product rather than just the part which has been digitally ordered, platform enabled or digitally delivered. As such, it could be interpreted that the product values presented in this paper are the maximum potential values, if those who do not already use digital ordering or digital delivery in production of the product, moved to digital ordering or digital delivery.

In our calculation of gross output we have excluded changes to work in progress and finished goods stock change as stock changes are not split by product level but we included own account capital formation (OAKF) for software and IT design and development related services. Most of the products we are interested in are services and will not have a stock change element but we assume most industries have some level of in-house, capitalised IT systems.

Appendix 1 shows how we have applied the 'Nature' section of the framework in our estimates. This involved identifying products within our NA06CC classification that were digitally ordered, platform enabled, and digitally delivered.

The level of detail presented in appendix 1 is the level of detail available in the supply-use system, although we were able to further split the retail and wholesale trade classifications. Some products are sufficiently detailed to identify as mostly digital. Others are far broader and include significant non-digital output. These products captured were kept constant over the time-series.

We also used the industrial sector when assessing the products identified in appendix 1. We removed industries which recorded some output of a product which was not likely to have the digital aspect that we were interested in.

Products that are sold from retail trade and wholesale trade industries are recorded only as margin and not as the gross product value. This is a divergence from the methodology of all other products where values are the gross total amount. We chose this methodology because the range of goods able to be sold via retail and wholesale trade is vast, particularly for department stores and supermarkets. If we were to include the value of all underlying products we would have included a much larger number of products and resulted in a less useful final figure for digitally ordered.

Digitally Ordered

Our estimates of digitally ordered goods and services produced in the New Zealand economy were NZD\$109.2bn (USD 81.8bn) in 2015. This is up from NZD\$81.6bn (USD 61.1bn) in 2007 and has increased at an annual pace of 3.8 percent over the period largely mirroring growth in total gross output of New Zealand at 4.0 percent from 2007-2015.

The value of digitally ordered gross output makes up around 20 percent of total gross output of New Zealand with this proportion remaining consistent over the observed period. Future estimates would need to account for the introduction of products over the time-series as they became digitally ordered. This would likely be difficult to estimate with any certainty which is why we have kept our products constant.

In estimating the value of digitally ordered we assumed a product is 'digitally ordered' if it was likely that online orders made up a non-insignificant portion of the industries' output. This was a subjective estimate without the use of a 'percentage sales made digitally' rule given this data isn't available.

Most products could feasibly be ordered digitally but only some products were likely to have been commonly purchased digitally. From a New Zealand perspective this equated to 49 products within our classification, 44 of which were services and the remaining 5 goods (appendix 1).

Of the 49 digitally ordered products included here, there are 112 sub-industries contributing to our NZD\$109bn total. Most of these values are small and relate to only one product. We can see the industries which contribute more than NZD \$1bn in gross output (appendix 2) with retail trade and financial services being the largest.

These values of digitally delivered gross output illustrate that digitisation is prevalent in a large part of New Zealand production. It shows that digitisation in this form is not necessarily tied to innovation but that the kind of digital ordering is the new normal for many industries. Most of the output included in the value of digitally ordered would still occur without the presence of digitisation.

In terms of understanding the overall extent to which digital ordering is common among New Zealand industries, this measure is useful. We can see this being especially useful for answering questions around the value of sales digitally vs. brick and mortar store sales. How we have applied it in this paper has not resulted in accurate figures to answer this question with further splits needed to be applied to product data.

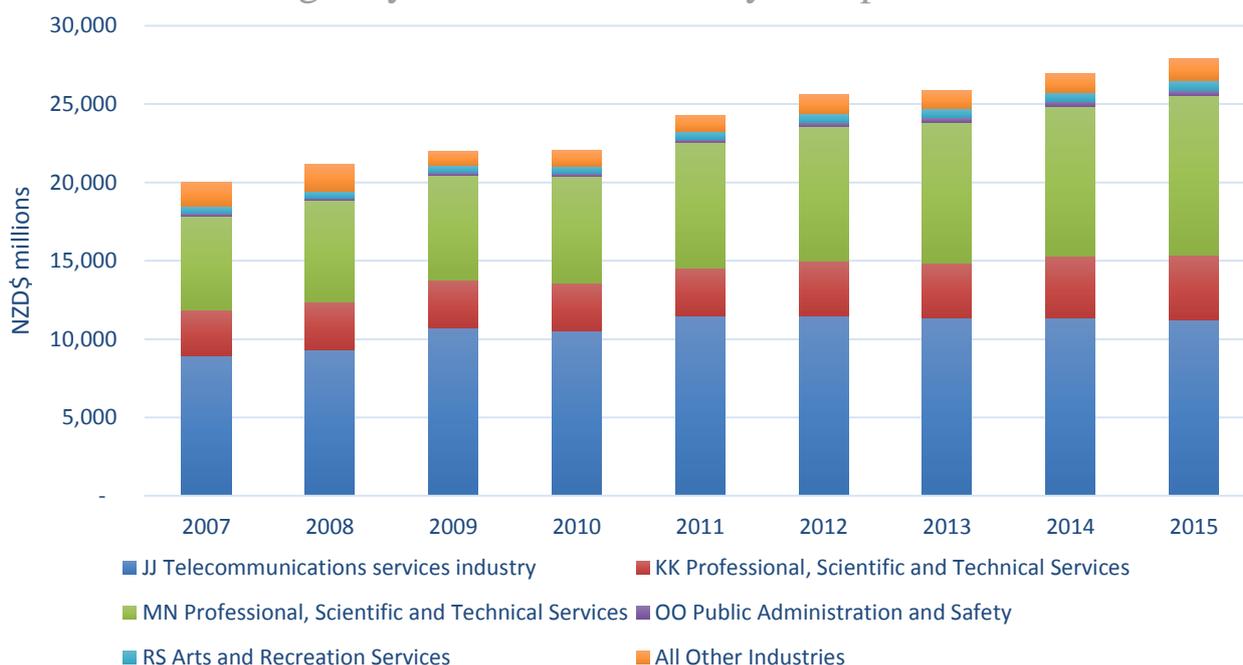
Digitally delivered

Gross output of digitally delivered products rose 39 percent over the decade from NZD\$20bn in 2007 to NZD\$27.9bn in 2015 (USD15bn to 20.9bn). On an annual basis, digitally delivered products increased more than total economy gross output with annual increases of 4.3 percent over the period 2007-2015 where New Zealand’s total gross output of increased 4.0 percent annually. Digitally delivered products contributed between 5.7 percent and 6.1 percent of total gross output over the observed period.

This increase in digitally delivered products was driven in part by a 10.0 percent annual average change in the value of mobile and internet telecommunications services and online content, information technology design and development related services, and licensing services for the right to use computer software and databases.

The digitally delivered dimension narrowed the focus of the digital economy and resulted in the gross output associated with digital delivered being just over a quarter of the value of digitally ordered transactions.

Digitally Delivered - Industry Composition



The major contributing industries were the telecommunications services industry, financial intermediation services directly measured (FISIM) from the banking and financing industry, and the computer system design and related services industry. The industry dimension can be seen in the graph below. Digitally delivered services are dominated by a few large industries with all other industries contributing a negligible amount.

The scope of ‘digitally delivered’ products is an area that was challenging to interpret in some cases. The note to OECD Informal Advisory Group members accompanying the second digital economy questionnaire indicated that ‘digitally delivered’ would include examples such as downloadable products and database services. Beyond these examples however there were activities that could be included as digitally delivered.

An example of a product we had discussions over was fixed telecommunications services. In practice this classification includes telecommunications package deals which are effectively delivered over the internet via VOIP but are classified as fixed telecommunications services. It was decided that while this service (telecommunications) was not downloaded, its delivery through the internet qualified it as a ‘digitally delivered’ product.

Another example is FISIM. The degree to which the financial sector is delivered digitally is likely to differ by country. In New Zealand the banking sector is fairly digitalised with consumer research agency Canstar Blue, reporting in 2015 that between 49 percent and 57 percent of New Zealand consumers used online banking depending on generational position⁵. It is our assumption that this proportion of users has grown and that FISIM is a service that has a significantly digitally delivered element.

The scope of digitally delivered production in this paper was more around including production which likely wouldn’t take place, or would look significantly different, without digitisation.

This dimension of the framework could also be useful in identifying industries which may experience changes in the short term with evolving technologies and potential disruptions to the way production is delivered and consumed.

Platform Enabled

Our classifications were not able to provide the level of detail required to adequately identify output from platform enabled means. Platform enabled activity can and are present in many industries still predominantly non-platform enabled. Using the methodology as presented above, we have not included any products because the platform enabled aspect of these activities is still likely to represent a relatively small proportion of total output for these sectors.

In this sense it was not useful to include these transactions as it would not provide any useful narrative. As was expected, to get reliable data on platform enabled production would require additional data sources or breakdowns that are currently not available within the existing National Accounts in New Zealand

However, we still consider this to be a useful part of the framework especially with emerging methods of estimating this activity developing. Stats NZ is engaging and developing relationships with a number digital intermediaries with the goal of obtaining usable admin data in the future. While these relationships are still very new this indicates a promising development going forward.

⁵ <https://www.canstarblue.co.nz/banking-insurance/banking/how-much-online-banking/>

Other potential methods for gathering data on platform enabled production includes web-scraping and the use of application program interfaces (APIs). Digitisation provides us with new methods of gathering information on this kind of activity which we hope can improve deflators and estimates of household consumption expenditure within National Accounts.

4. Direct vs Indirect

We found digitally delivered to be the easiest to identify when attempting to estimate the digital economy from existing macro-economic data in our National Accounts. At an aggregate-level, there are few indicators of digital businesses and transactions.

Comparing the gross output of digitally delivered products with digitally ordered leads us closer to a representation of the gross output directly attributable to the digital economy and the value indirectly attributable to the digital economy.

Direct contribution of the digital economy would likely include activities only made possible through digital means. For our purposes 'digital means' would include production in and over computer networks which are otherwise unable to be produced through a non-computerised mechanism. The types of products included within digitally delivered and platform enabled dimensions of the framework would contribute that most to a direct measure of the digital economy. Digitally ordered direct contribution is likely to be much smaller compared to its indirect contribution to the digital economy.

Products that might be included in a direct contribution estimate from our list of digitally delivered products are; Packaged software; Mobile telecommunications services; Telecommunications services and online content; and Licensing services for the right to use computer software and databases.

The framework set out above is a useful concept in practically determining different types of digital economy production, however the level of detail required to accurately identify and classify these activities is not available within current National Accounts data.

Any potential digital economy satellite would benefit in usability if it followed other satellites which estimate direct and indirect contributions to value added or gross output. The delineation of 'digitally ordered', 'digitally delivered', and 'platform enabled' would be useful within a satellite account as additional estimates for aiding in analysis of the digital economy.

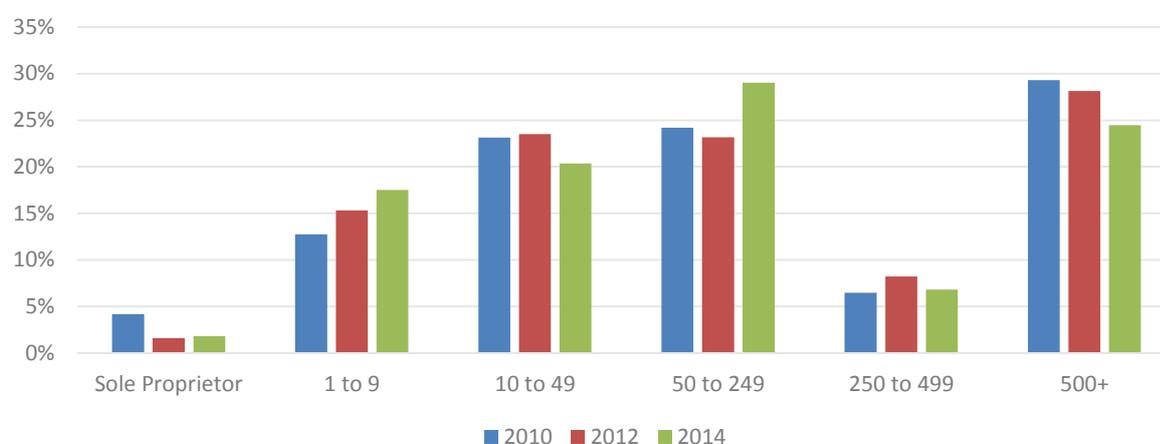
5. Enablers

With the recent redevelopment of the ICT Supply (ICTS) survey at Stats NZ, we decided to also look at the 'enablers' dimension of the framework which was added to the framework by the OECD Advisory Group.

The ICTS survey run by Stats NZ is naturally suited to support of this dimension. Until 2014, the biennial survey had been a census targeting all economically significant resident New Zealand businesses involved in producing and/or supplying information and communication technology (ICT) goods and services. In 2017, a re-designed ICT survey was put into the field, and re-named ICT Software and Services (ICTSS) due to its stripped back nature. This survey is now a sample of businesses instead of a census and now only focuses on the sales of software and services.

We found that in 2010 and 2012, the rolling mean employment (RME) group of 500+ employees contributed the most to total sales, but in 2014 the RME group of 50 to 249 contributed the most. This is reflective of the RME grouping of 50-249 being the second fastest growing segment behind businesses with a RME of 1-9.

Total Sales by Rolling Mean Employment Count



The forthcoming data from the redesigned ICTSS survey, due early 2018, will provide us with new insights as to the changing nature of the companies acting as enablers of the digital economy in New Zealand. We will also be interested in the new figures around IT hosting and cloud computing services which may be reasonably expected to have increased since the survey was last run in 2014.

6. Other developments at Stats NZ

Within Stats NZ, there is also work taking place on the digital economy in particular from the Prices unit, as well as in the International Business Statistics team from their contribution to the Digital Nation Domain Plan.

The Prices Development team at Stats NZ are looking at several additions from the digital economy to the CPI. The team is looking to add “Private accommodation rented from others” and ride-sharing to the CPI basket of goods. The prices for this will most likely be collected through APIs and web-scraping with weights determined from a mixture of household expenditure surveys and market research.

The Prices team are also interested in digital downloads of films, music, and video games which are currently included in the CPI basket but are likely to be under-reported.

Over the past two years the Prices team at Stats NZ have increased their focus on new tools such as web-scraping and APIs to increase their coverage of not only new data sources such as APIs but also for traditional activities. It is thought that their work in this area and on the digital economy will be able to be incorporated into the National Accounts in the future.

The Digital Nation Domain Plan is another significant piece of work that Stats NZ is involved in, along with the lead for the Digital Nation programme, MBIE.

So far this work has involved a stock-take of the enduring questions facing government. These questions have focused on what New Zealanders are doing with digital technologies; what New Zealanders want to do with digital technologies; and what policy makers would like New Zealanders to do with digital technologies. The Digital Nation programme has been developed across government, with the support of

New Zealand's digital community and aligns closely with the OECD 'Going Digital' projects' Pillar 1, Horizontal activities⁶.

The OECD Going Digital project and the Digital Nation programme both seek to increase the accessibility and effective use of digital technologies to drive innovation, improve productivity, and enhance quality of life. The cross government and stakeholder approach, suggested by the Going Digital project and already set in motion by Stats NZ and MBIE, positions New Zealand well in the digital policy environment internationally.

While the Digital Nation programme may not result in statistics that will be immediately implemented in the National Accounts, it will help to further develop digital economy understanding within Stats NZ and across government.

7. Conclusion

The central theme of this paper was simply an attempt at applying the framework we received with the second OECD questionnaire in May 2017. The digital economy is an area of interest to Stats NZ but among many areas which could benefit from additional focus and research. The work presented in this paper was an interesting exercise at applying a very useful framework for understanding the digital economy in New Zealand using our existing National Accounts data.

Our work highlighted the need for further discussion to improve the understanding around the scope of digitally ordered and digitally delivered. It also highlighted one way of how this framework may be implemented on existing National Accounts data, and the data gaps that hamstring these estimates to a low level of quality.

The continued work on the digital economy across Stats NZ and the developing data sources for key activities taking place in this area are exciting potential developments which we hope will improve our coverage and ability to measure the digital economy in New Zealand.

⁶ <http://www.oecd.org/going-digital/project/>

APPENDICES

APPENDIX 1.

National Accounts Commodity Classification (NA06CC) - selection of products

NA06CC	Description	Digitally ordered?	Platform enabled?	Digitally Delivered?
322.00	Books, maps, music, cards, pictures and plans; excluding advertising material	Y	N	Y
323.00	Newspapers and periodicals, in print	Y	N	N
493.00	Games and toys; roundabouts, swings and other fairground amusements	Y	N	N
710.00	Wholesale trade services	Y	N	N
720.00	Retail trade services	Y	N	N
730.00	Accommodation services	Y	N	N
741.00	Meal serving services	Y	N	N
751.10	Road transport services of freight; transport services via pipeline	Y	N	N
751.20	Road passenger transport	Y	N	N
752.10	Railway transport services of freight	Y	N	N
752.20	Railway passenger transport	Y	N	N
753.20	Water passenger transport	Y	N	N
754.10	Air transport services of freight	Y	N	N
754.20	Air passenger transport	Y	N	N
755.00	Scenic and sightseeing transportation services	Y	N	N
756.00	Postal and courier services	Y	N	N
768.00	Freight transport agencies and other supporting transport services	Y	N	N
781.00	Publishing, printing and reproduction services	Y	N	N
782.00	Packaged software	Y	N	Y
783.00	Audio, video and other disks, tapes and other physical media, recorded	Y	N	N
784.00	Audio-visual and related services	Y	N	Y
785.00	Broadcasting, programming and programme distribution services	Y	N	Y
786.10	Fixed telecommunications services	Y	N	Y
786.20	Mobile telecommunications services	Y	N	Y
789.00	Internet telecommunications services and online content	Y	N	Y
791.20	Library and archive services	Y	N	Y

811.10	Financial intermediation services directly measured	Y	N	Y
811.11	Financial intermediation services, insurance services and pension services	Y	N	N
812.10	Life insurance	Y	N	N
812.20	Accident and health insurance services	Y	N	N
812.30	Other insurance services	Y	N	N
813.00	Services auxiliary to financial services other than to insurance and pensions	Y	N	N
814.00	Services auxiliary to insurance and pensions	Y	N	N
821.10	Leasing or rental services concerning transport equipment without operator	Y	N	N
822.10	Licensing services for the right to use computer software and databases	Y	N	Y
831.10	Real estate services involving own or leased residential property	Y	N	N
915.00	Accounting, auditing, bookkeeping, insolvency, receivership and taxation services	Y	N	Y
916.00	Advertising services and provision of advertising space or time	Y	N	Y
917.00	Market research and public opinion polling services	Y	N	Y
923.10	Information technology design and development related services	Y	N	Y
924.00	Travel arrangement, tour operator and related services	Y	N	N
925.00	Employment services	Y	N	N
931.10	Local government administration services	Y	N	N
932.10	Central government administrative services	Y	N	N
961.00	Live entertainment event presentation and promotion services; services of performing and other arts; museum and preservation services	Y	N	N
962.10	Sports and recreational sports facility operation services	Y	N	N
963.20	Lottery services	Y	N	N
963.30	Racing and sports betting services	Y	N	Y
963.40	Online gambling services; gaming machines outside of casinos; other gambling services	Y	N	N

The full classification can be found here:

<http://aria.stats.govt.nz/aria/#ClassificationView:uri=http://stats.govt.nz/cms/ClassificationVersion/CARS7209>

APPENDIX 2.

Digitally Ordered Industries Industries >NZD\$1bn

Digitally Ordered Industries (\$ millions)	2015	2014	2013	2008	2007
GH Retail Trade	20,643	19,217	18,449	16,117	15,279
KK Financial and Insurance Services	19,899	18,314	16,822	16,403	15,442
II Transport, Postal and Warehousing	17,487	16,511	15,691	14,946	13,866
MN Professional, Scientific and Technical Services	12,558	11,950	11,199	8,436	7,823
LL Rental, Hiring and Real Estate Services	11,586	10,799	10,001	7,540	7,235
JJ Information Media and Telecommunications	11,812	11,926	11,929	10,377	9,993
FF Wholesale Trade	7,601	7,324	7,274	6,662	6,039
RS Arts and Recreation Services	3,411	3,258	3,201	3,098	3,013
CC Manufacturing	1,746	1,656	1,763	1,522	1,498

APPENDIX 3.

Definitions

Digitally ordered

“An ecommerce transaction is the sale or purchase of a good or service, conducted over computer networks by methods specifically designed for the purpose of receiving or placing orders. The goods or services are ordered by those methods, but the payment and ultimate delivery of the goods or services do not have to be conducted online. An ecommerce transaction can be between enterprises, households, individuals, governments, and other public or private organizations. To be included are orders made over the web, extranet or Electronic data interchange. To be excluded are orders made by phone, fax or manually typed email.”⁷

Platform Enabled

An important characteristic of digitalisation is peer-to-peer services intermediated by digital intermediary platforms (“sharing economy”, “gig economy”, “collaborative economy”) such as Airbnb, Uber, eBay, that facilitate transactions in goods and services.⁸

Digitally delivered

The third dimension is referred to as *digitally delivered*; in other words, it captures those services and data flows that are delivered digitally as downloadable products. Examples include software, e-books, data and database services. Goods, as physical items, are not very likely to be digitally delivered *en masse*. However, 3D printing may possibly result in a (future) category of transactions that could be classified under digitally delivered goods, if these transactions are deemed to be fundamentally different from trade in services (of 3D blueprints) transactions.

Direct vs Indirect contribution

Direct contribution is where the use of digital mediums is the reason for the activity and accounts for all or most of the value of the activity. Indirect contribution is simply activity facilitated by digital mediums where the product or service is carried out physically (non-digitally).

Calculation used for Gross Output

$$GO = O_{thinc} + Margin + OAKF + SFOU + \text{Work in Progress Stock change} + \text{Finished goods Stock change} + FBVEXGST$$

⁷ OECD, Guide to Measuring the Information Society, (2011). Retrieved from <http://www.oecd.org/sti/ieconomy/oecdguidetomeasuringtheinformationsociety2011.htm>

⁸ Erich Strassner and the OECD Informal Advisory Group on Measuring GDP in a Digital Economy Second Digital Economy Questionnaire

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