

2020

A Technical Report for the 2020 Critical Skills List

Labour Market Intelligence
research programme



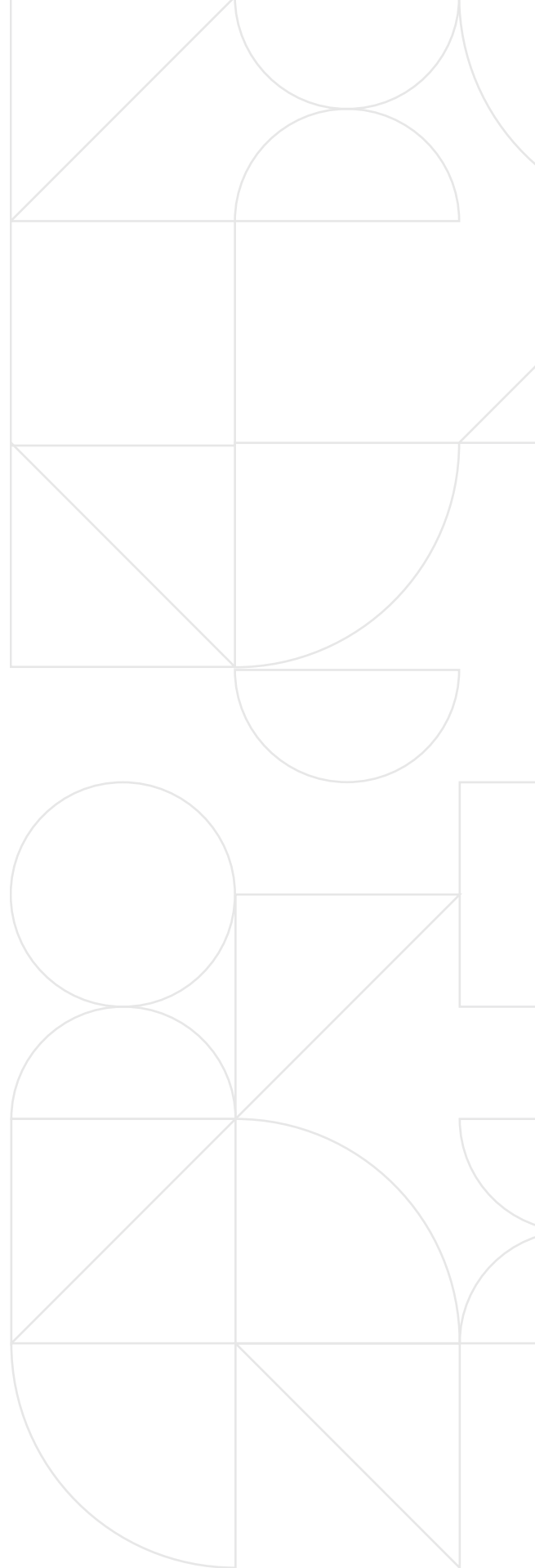
higher education
& training
Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA



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Acronyms and abbreviations

AgriSETA	Agriculture Sector Education and Training Authority
BPESA	Business Processes Enabling South Africa
CATHSSETA	Culture, Arts, Tourism, Hospitality, and Sports Sector Education and Training Authority
CETA	Construction Education and Training Authority
CESM	Classification of educational subject matter
CFE	Call for evidence
CHIETA	Chemical Industries Sector Education and Training Authority
CHW	Community healthcare worker
CJ	Career Junction
COVID-19	Coronavirus disease 2019
CSL	Critical Skills List
D1	Dimension 1
D2	Dimension 2
D3	Dimension 3
D4	Dimension 4
DEL	Department of Employment and Labour
DHET	Department of Higher Education and Training
DTIC	Department of Trade, Industry, and Competition
ESSA	Employment Services South Africa
ETDP SETA	Education, Training, and Development Practices Sector Education and Training Authority
EW SETA	Energy and Water Sector Education and Training Authority
Fasset	Financial and Accounting Services Sector Education and Training Authority
FTE	Full-time equivalent
FoodBev SETA	Food and Beverage Sector Education and Training Authority
FP&M SETA	Fibre Processing and Manufacturing Sector Education and Training Authority
HTFV	Hard-to-fill vacancy
HWSETA	Health and Welfare Sector Education and Training Authority
INSETA	Insurance Sector Education and Training Authority
IPAP	Industrial Policy Action Plan
JOI	Job Opportunities Index
LMDS	Labour Market Dynamics Survey
LGSETA	Local Government Sector Education and Training Authority
LMIP	Labour Market Intelligence Project

MAC	Migration Advisory Committee
merSETA	Manufacturing, Engineering, and Related Services Sector Education and Training Authority
MICT SETA	Media, Information, and Communication Technologies Sector Education and Training Authority
MQA	Mining Qualifications Authority
NQF	National Qualifications Framework
OECD	Organisation for Economic Co-operation and Development
OFO	Organising Framework for Occupations
OIHD	Occupations in High Demand
PCA	Principal component analysis
PIVOTAL	Professional, vocational, technical, and academic learning
PSET	Post-school education and training
PSETA	Public Services Sector Education and Training Authority
QLFS	Quarterly Labour Force Survey
SASSETA	Safety and Security Education and Training Authority
SAQA	South African Qualifications Authority
SETA	Sector Education and Training Authority
SEZ	Special economic zones
SIP	Strategic integrated projects
TETA	Transportation Education and Training Authority
TVET	Technical and vocational education and training
W&R SETA	Wholesale and Retail Sector Education and Training Authority

PART 1

Introduction to the Critical Skills List (CSL)



As a result of globalisation, climate change mitigation, and digital transformation, there is a need for skills to evolve more rapidly than ever before. These rapid economic shifts often create skills shortages and skills mismatches within labour markets. Although the misalignment between supply and demand for occupations is inevitable to some degree, persisting labour market imbalances may further lead to delays in the adoption of new technologies and act as a hindrance to productive activity.

Some skills mismatches can be solved by, inter alia:

- Creating, updating, or changing qualifications offered at technical and vocational education and training (TVET) institutions or universities;
- Honing enrolment planning processes; or
- Providing scholarships/bursaries/learnerships for potential students (Barnow, Trutko, & Lerman, 1998).

However, it is clear that most interventions of this nature take a long time before they reap benefits (given the time required to alter curricula or sufficiently upskill a potential employee). This lag between implementation and results creates the need for a short-term intervention that can quickly help to plug those skills gaps that are not being filled by the current domestic labour market (Organisation for Economic Co-operation and Development [OECD], 2016).

It is, therefore, necessary in some cases to provide immigration preference to foreign nationals who are sufficiently skilled in areas where the domestic labour supply is not able to match employer needs, at least in the short-term.

According to section 19 (4) of the Government of South Africa's Immigration Act (no. 13, 2002):

an exceptional [critical] skills work permit/[visa] may be issued by the Department [of Home Affairs] to an individual with exceptional skills or qualifications. (University of Pretoria, 2014)

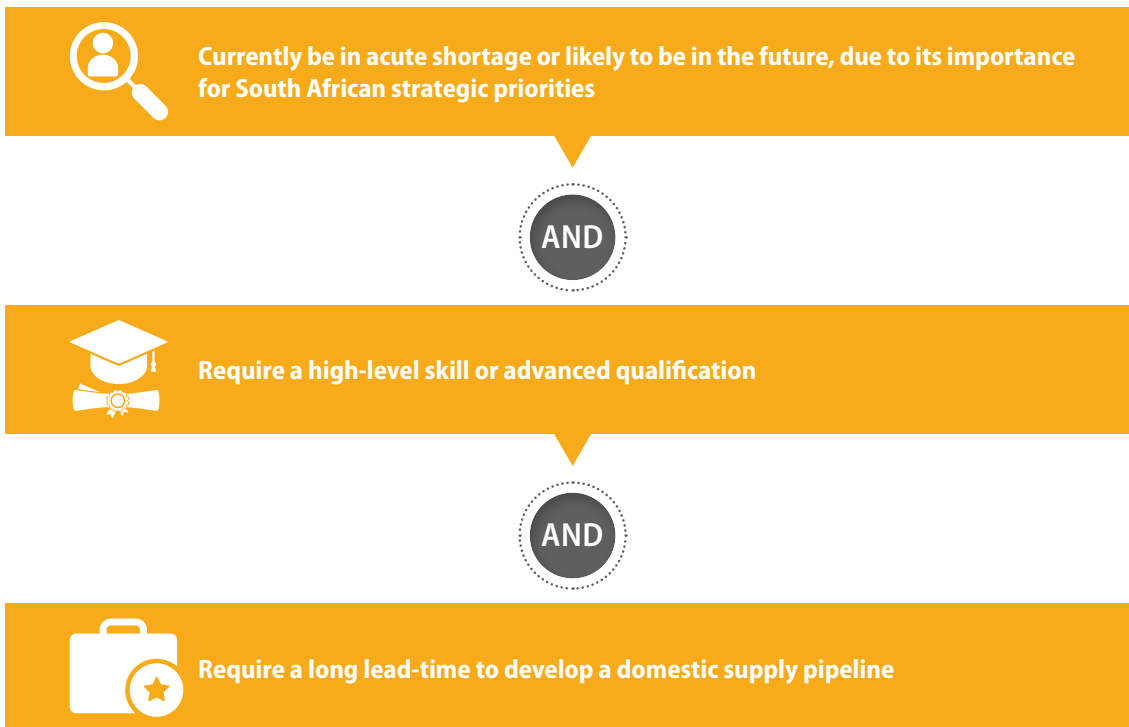
Finding the correct balance is essential. If critical skills work permits are offered too liberally, they risk taking employment opportunities away from South African citizens. Conversely, if these permits are too strictly withheld, skills gaps are perpetuated at the expense of the South African economy. Achieving this balance is largely dependent on accurately defining a critical skill and then using this definition to develop the appropriate criteria for recognising whether a skill is, in fact, critical or not.

The Department of Home Affairs (DHA) defines critical skills as:

skills that are regarded, through labour market availability and analysis, to be critical for improvement in economic growth and without which certain projects and work could not be undertaken, as well as high-level skills that will enhance the skills pool in the economy which in turn will encourage and potentially accelerate growth in the economy. (DHA, 2019)

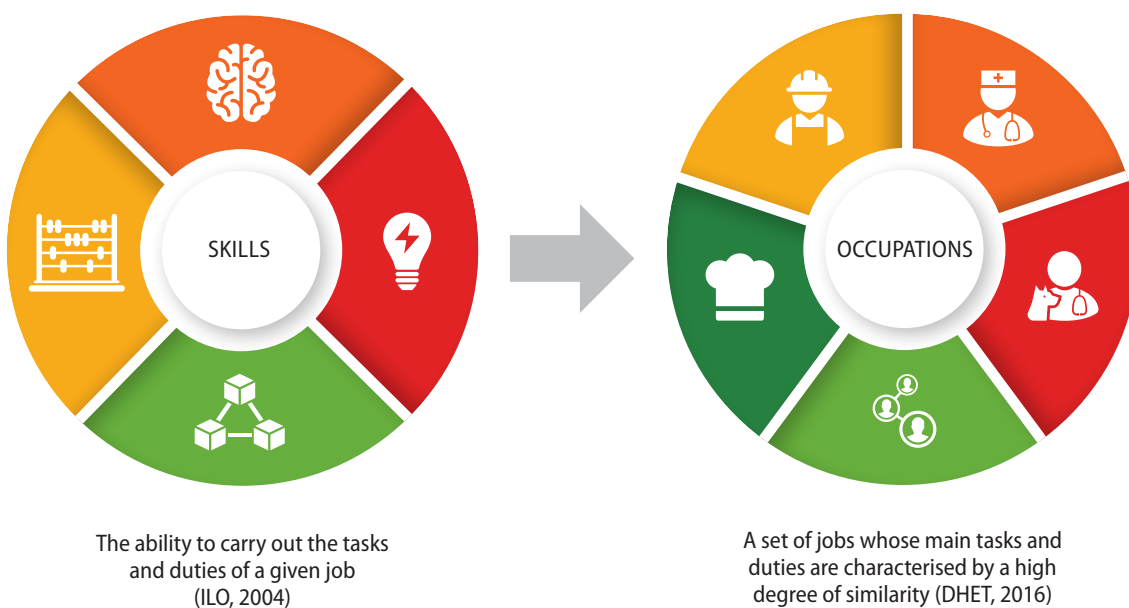
This definition acts as a guiding light for the development of the Critical Skills List (CSL). The CSL, therefore, is comprised of occupations that fulfil the criteria referenced in the definition.

For an occupation to be included in the CSL, it must:



The relationship between occupations and skills is important to note here. After an extensive literature review, Reddy, Rogan, Mncwango, and Chabane (2018) find a complex relationship between the two concepts and conclude that “it is evident that the distinction between the two is not always clear, but that they cannot be discussed in isolation from each other as they are ultimately linked” (Reddy et al., 2018). The authors further find that, due to the many challenges regarding the measurement of skills, indirect measures or proxies, such as occupations, are often used. This, therefore, is also the approach that is used for the CSL, based on the definition of the two concepts in Figure 1.

FIGURE 1: Relationship between skills and occupations



Source: ILO (2004); DHET (2016)

It is important to note that the DHA is the custodian of the CSL. The CSL presented at the end of this technical report, therefore, remains preliminary. It is the responsibility of the DHA to refine and focus the list before it can be gazetted officially, as required by legislation. Thus, in terms of legislation, the gazetting of the CSL is the responsibility of the Minister of Home Affairs.

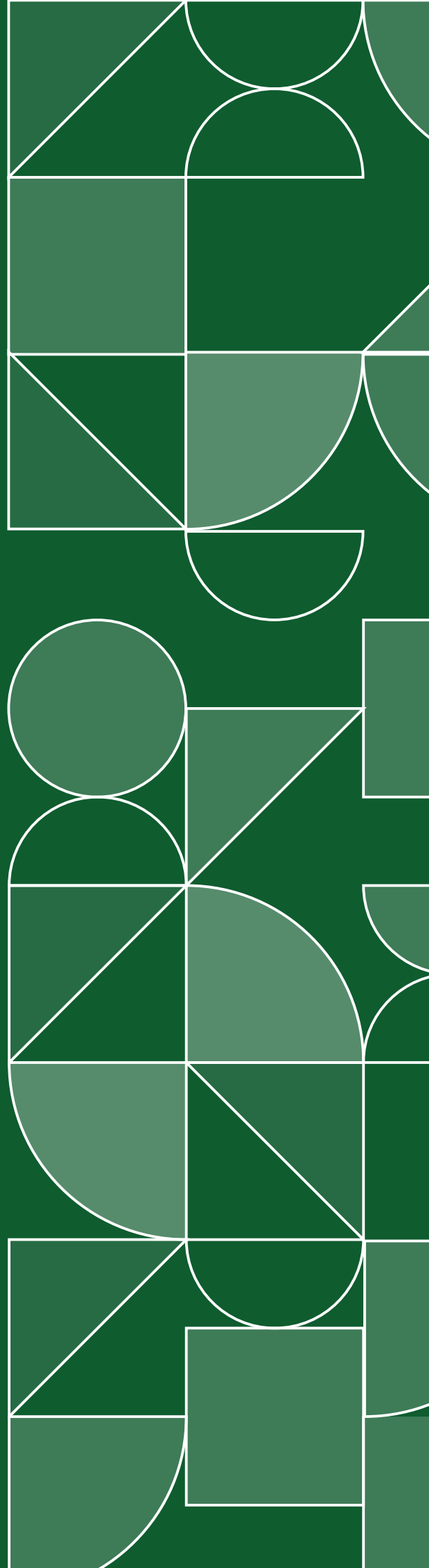
The gazetted DHA-authored list will represent more policy-related discussions (such as the number of work visas available for particular occupations) given that these policy-related decisions fall outside the remit of the DHET and are, therefore, the responsibility of the DHA. It is of the utmost importance for this process to be well-documented and transparent, and for any inclusions or exclusions to be clearly explained. This will build on the methodology presented in this report and consequently build confidence in the CSL as an essential policy instrument.

This report presents a primed CSL ready for finalisation by the DHA. The report's main aim is to discuss how the definition of critical skills and the criteria used to identify them inform the methodology used to identify the correct occupations for this list. This report lays the foundation for the methodology used in establishing the CSL by reviewing the literature surrounding the measurement of similar critical skills lists in other countries. It then sets out a methodology statement, presents an analysis of the occupations included in the CSL, and, finally, introduces the CSL itself. This is followed by conclusions and recommendations for improving future iterations of the CSL.

Prior to all of this, it is important to present South Africa's Organising Framework for Occupations (OFO), as the OFO represents an essential building block for understanding the methodology employed to create the CSL.

PART 2

Organising Framework for Occupations (OFO)



According to the DHET, the OFO is a classification framework that attempts to “establish a common language for talking about occupations”. The OFO:

is a skill-based, coded classification system of occupations which is used by the DHET for “identifying, reporting and monitoring skills demand and supply” in the labour market. It captures almost all occupations in the country and classifies them by skill level and skill specialisation. (Reddy et al., 2018, p. 10)

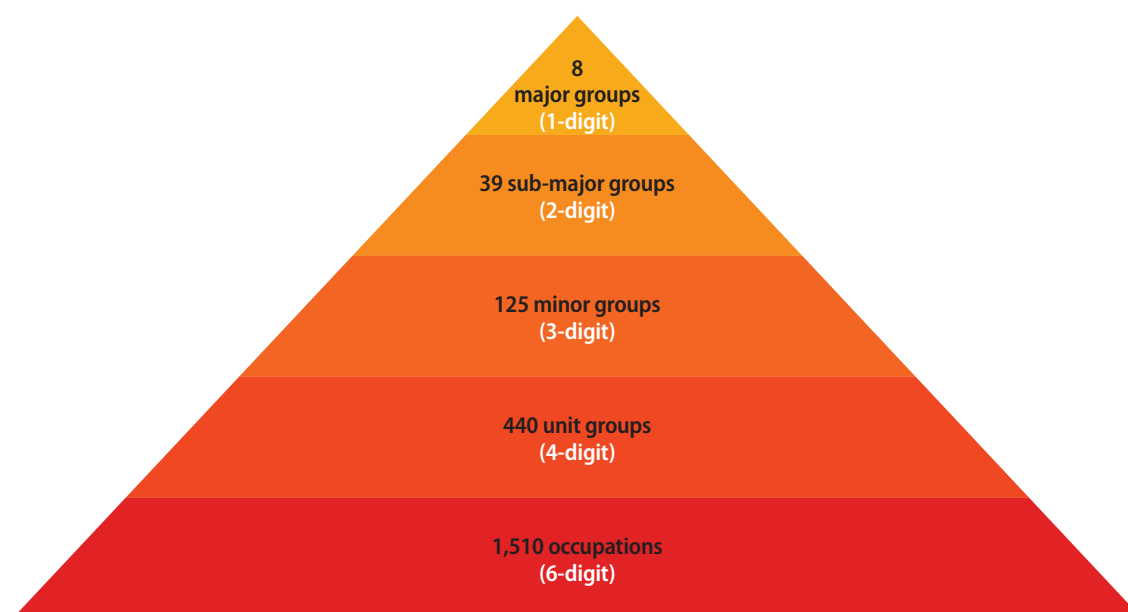
The framework consists of eight major groups categorised primarily according to skill level and secondarily according to area of specialisation. The eight major groups are presented in Table 1.

TABLE 1: Meaning of 1st digit of OFO code

OFO-CODE FIRST DIGIT	DESCRIPTION
1	Managers
2	Professionals
3	Technicians and associate professionals
4	Clerical support workers
5	Service and sales workers
6	Skilled agricultural, forestry, fishery, craft, and related trades workers
7	Plant and machine operators and assemblers
8	Elementary occupations

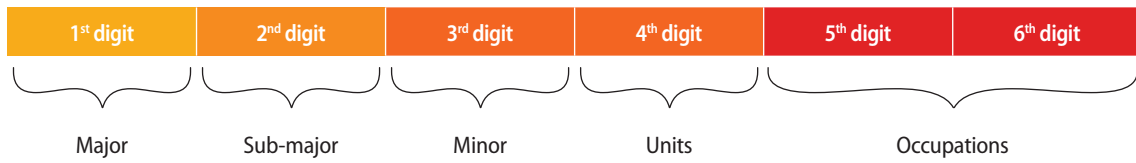
Each of these major groups are then disaggregated. There are four levels of disaggregation, with each subsequent level providing more specific detail than its predecessor. As shown in Figure 2, the eight one-digit major groups together encapsulate the entire set of 1,510 six-digit occupations.

FIGURE 2: Number of classifications in the OFO



Source: DHET (2019)

Occupations are, therefore, the lowest coded level of disaggregation.¹ Each occupation is given a six-digit code, with each digit in the code referring to its respective groupings as depicted in the pyramid above. This can most easily be understood as follows:



The eight major groups will be of specific interest when analysing the composition of the list. The major group indicates the skill level and the broad area of specialisation. Figure 3 maps the major groups to the National Qualifications Framework (NQF) levels. It shows that the lower major groups are generally associated with higher NQF levels and vice versa.

FIGURE 3: Relationship between OFO major categories and NQF level

NSDS (level of skill required for a given NQF)	NQF	OFO MAJOR GROUP			
High	10	2 Professionals		1 Managers	
	9				
	8				
	7				
Intermediate	6	3 Technicians and associate professionals			
	5	4 Clerical support workers	5 Service and sales workers	6 Skilled agricultural, forestry, fishery, craft, and related trade workers	7 Plant and machine operators and assemblers
4					
Entry	3				
	2	8 Elementary occupations			
	1				

Source: DHET (2015)

The importance of the OFO and the relationships presented in Figure 3 will become apparent in subsequent sections of this report.

¹ There are specialisations within the occupations in the OFO, but these are not coded.



PART 3

Conceptualising the criteria for CSL inclusion

To recap, in the introduction, the DHA definition of critical skills was broken down into criteria that should be fulfilled in order to identify occupations that align to this definition. An occupation included in the CSL must:



Currently be in acute shortage or likely to be in the future, due to its importance for South African strategic priorities

AND



Require a high-level skill or advanced qualification

AND



Require a long lead-time to develop a domestic supply pipeline

Both the international and South African literature sheds light on how each of these facets can be measured objectively. This is broken down in the following sub-sections.

3.1 Conceptualising occupations in acute shortage

The policy interventions that are required to address skills imbalances rely on having credible information about current and future skills needs. Skills mismatches are, in many respects, driven by whether there is a shortage or surplus of sufficiently skilled candidates within a labour market.

Occupational shortage can be measured directly by comparing the demand for and supply of that occupation (Sutherland & Lodge, 2010). Put differently, it is theoretically possible to measure shortage by comparing the number of positions advertised for an occupation (demand) over a specified period with the number of *qualified* applicants for the same occupation (supply). If the number of applicants is less than the number of positions advertised, an occupation is said to be in shortage (Barnow, Trutko, & Lerman, 1998; Asmal, Bhorat, Culligan, Hofmeyr, Monnakgotla, Oosthuizen, & Rooney, 2020).

Such an indicator of shortage would require information across all occupations and across all job application platforms in the country. Only then could truly informed decisions be made regarding whether there is a shortage of prospective workers for particular occupations or not. However, relying too heavily on this direct estimate of labour shortage comes with challenges:

1. Occupations for which applications and openings are captured through online portals tend to be focused overwhelmingly on professional skills rather than artisanal skills;
2. Only a handful of applicants or job postings would likely appear on any single career portal, making it difficult to collate all career portal information within a country;
3. The number of qualified applicants for a position is likely to be over-estimated,² as not all applications will come from individuals with the requisite skills; and
4. Data for job applications not advertised on the internet is not available.

Therefore, the literature points out that no **single** measure to identify occupational shortages should be relied on exclusively (Shah & Burke, 2005; the Migration Advisory Council [MAC], 2013; OECD, 2018). Instead, experts have proposed the simultaneous use of a set of direct and indirect measures (called signals) of occupational shortage. While there are several approaches internationally to doing this, two in particular are highly informative. These are included within the shortage occupations lists produced by the UK's Migration Advisory Committee (MAC) and the Organisation for Economic Co-operation and Development's (OECD) Skills for Jobs indicators.

In the absence of a single indicator of occupational shortage, both approaches create a multi-dimensional index comprised of a range of direct and indirect measures (proxy indicators); that is, they combine several indicators into a single indicator. The strength of such an approach is two-fold. Firstly, because each proxy indicator will, by definition, be imperfect, the index creates a holistic picture utilising cumulative evidence instead of considering each indicator in isolation. Secondly, because each indicator is weighted explicitly, the importance placed on each indicator is transparent and therefore open to discussion and critique.

The UK's MAC methodology provides the most explicit guidance for deciding which indicators should be considered as appropriate proxies. It proposes that indicators of vacancy pressure, wage pressure, and employment pressure should be considered (Reddy et al., 2018).

Each of these indicators of shortage will be defined and discussed below. Important to note with each of them is that their definitions are stated in **relative terms**. This idea comes from the OECD's Skills for Jobs methodology. This methodology suggests that any indicator of shortage for an occupation should be considered relative to all other occupations. Using relative measures mitigates the distortionary effects that changes to the macro-economy could have on the signals of occupational shortage (OECD International Labour Office, 2018).

² This over-estimation might also come about due to duplication – one individual might apply for the same occupation on many different websites, duplicating both the number of occupations available and the number of applicants.

Vacancy pressure

A greater persistence of vacancies for an occupation relative to other occupations

Vacancy pressure can be measured by considering aspects of hard-to-fill vacancies (HTFVs) and vacancy growth alike.

HTFVs: Vacancies are defined as “hard-to-fill” when it takes at least six months for the position to be filled (Asmal et al., 2020).

Vacancy growth: Indicated by the growth in the number of vacancies (job adverts) for an occupation over a specified period.

While vacancy growth considers the number of vacancies (job adverts), HTFV also considers the time it takes to fill these vacancies. HTFVs, therefore, signal present shortage. Vacancy growth, on the other hand, points to potential shortage in the future by signalling a rapid increase in demand in the present. Considering these indicators together provides the best picture of vacancy pressure across time.

Vacancy pressure arises when:

- The labour market experiences a skills deficiency (where the availability of adequately skilled individuals within a market is low or constrained) (Green, Machin, & Wilkinson, 1998; Shah & Burke, 2005); or
- Recruitment processes are not ideal (where skilled individuals are available but do not end up pursuing employment opportunities within the market) (Bosworth & Warren, 1992; Marchante, Ortega, & Pagan, 2006).

The latter highlights unfavourable industry-specific characteristics that may discourage qualified individuals from applying,³ while the former speaks to the mismatch between what employers need and what potential candidates can provide. It is only in the former case, though, that vacancy pressure signals occupational shortage, as this points to the possibility that the skills-base within the domestic labour market is not sufficiently matched to employer needs.

In the UK, before the MAC methodology was implemented, the Department of Employment and Workplace Relations used changes **in the number of general vacancies** (vacancy growth) and HTFVs to construct a list of occupations for which there was an occupational shortage (Sutherland & Lodge, 2010). This exercise was carried out by analysing the number of job advertisements and the length of time before those advertised positions were filled.

Reasons for not exclusively relying on vacancy pressure as the indicator of occupational shortage include:

1. Vacancy data is often dated and duplicated: the same vacancy may appear across different sources or be double-counted within the same source;
2. Vacancy pressure could signal more than just occupational shortage (i.e., unfavourable industry characteristics). The indicators of vacancy pressure could, therefore, not be pointing to a skills shortage but rather an issue with the labour market itself.

³ This may, for example, extend toward perceived poor working conditions or offers of compensation below average market-related rates.

Wage pressure

A steeper upward trend in wages for an occupation relative to other occupations

Wages are known to respond to shortages of particular skills. An increase in wages over time signals that:

- Demand for an occupation is increasing (employers are now willing to pay a premium for workers who they believe to be sufficiently skilled); or
- The supply of applicants for an occupation is shrinking (making a sufficiently qualified candidate more valuable to an employer who, again, is willing to pay a premium for their labour) (MAC, 2013; OECD, 2016; Reddy, et al., 2018).

For these reasons, the OECD Skills for Jobs database uses wage growth over time as a signal of occupational shortage (OECD, 2019).

In this OECD database, wage growth rates are estimated for 33 occupational groups (groups of similar occupations within particular industries) and compared to the corresponding economy-wide wage trends. If wages for an occupational group are found to be growing faster than average/median economy-wide wages, then occupations that fall within that group are identified as being in relative shortage in the labour market.

Reasons for not exclusively relying on wage pressure as the indicator of occupational shortage are:

1. Increasing wages could indicate the strength of labour unions within an industry, which is independent of the current balance between demand and supply; and
2. Historical increases in wages do not necessarily predict future growth.

Employment pressure

A steeper upward trend in employment for an occupation relative to other occupations

Employment pressure can be measured by employment growth and employment intensity.

Employment growth indicates an increased number of individuals employed within an occupation. While this does indeed indicate increased demand, it also indicates that the demand is being met. From an occupational shortage point of view, employment intensity is, therefore, a more important metric. The literature also notes the importance of using **employment intensity** (number of hours worked per occupation) (Reddy et al., 2018).

Employment intensity, therefore, signals that employers would rather increase the hours worked by their current employees than hire additional employees (Reddy et al., 2018; OECD, 2019). Such a practice could certainly signal a supply shortage, but it could also signal high recruitment costs and excessive administrative burdens and/or the influence of labour unions. As such, this signal is also too broad to be considered by itself when measuring occupational shortage.

To reiterate, the literature repeatedly points out that quantitative evidence should not be considered in isolation. That means that all aspects of shortage (direct measurements as well as signals/indirect

measurements) are important to analyse when trying to assess which occupations within a labour market are experiencing the most acute shortages relative to others.

However, quantitative evidence is often insufficient on its own. It requires corroboration and further contextual analysis before statistical truths can be transformed into insight. This lack of granular detail creates the need to include a more textured analysis surrounding the trajectory of the country as a whole – learnings specifically pulled from the UK's MAC methodology.

3.2 Conceptualising strategic priority

It is not possible to capture all labour market phenomena by using data and statistics alone. Although important insights can be formed by analysing historical trends and forecasting, it is difficult for such an analysis to consider the impacts of macro- and micro-economic policy choices and strategic decisions. Moreover, as made clear in section 3.1, data has its own limitations. To compensate for these data limitations, the UK's MAC methodology suggests the use of qualitative information to bolster the statistical analysis where possible. For the CSL, this is done by explicitly considering South Africa's **strategic priority commitments** (Reddy et al., 2018).

If a sector is viewed as being of strategic importance to a country's development, an influx of state-led investments (backed by various private sector cohorts) creates a subsequent increase in occupational demand within that sector by:

1. Creating novel occupations for which there was previously no demand; and
2. Bolstering the demand for occupations whose functions and skills are linked closely with the successful implementation of strategic priorities.

In this light, it is acknowledged that these strategic plans and priorities should be considered in assessing occupational shortages or extraordinary changes in occupational demand. The analysis of strategic priority provides a more textured picture of why certain occupations might be in relatively higher demand than supply, but it also provides contextual reasoning for why certain occupations might be more in demand in the future than what is suggested by current quantitative evidence alone.

Acute shortage and strategic priority identify occupations that are currently in short supply or are likely to be in the future. There are various mechanisms through which such a shortage can be addressed. In the context of the CSL, this mechanism is immigration. However, although a necessary condition, a shortage is not a sufficient condition for inclusion into the CSL. It also has to be unlikely that the necessary pipeline of sufficiently qualified individuals can be produced domestically before economic development is constrained by the shortage.

Fortunately, international and domestic literature also guides how this can be conceptualised and corrected for, especially when operating in the context of a list of critical skills. The ability of a country to produce sufficiently skilled domestic candidates or not is discussed next.

3.3 Conceptualising technical and professional competence and long lead-time

Beyond understanding occupational shortage, the efficiency with which shortage can be addressed domestically is essential within the context of the CSL. Here it is important to consider the reasons for an inadequate pipeline of sufficiently skilled individuals. Either:

1. There is no academic qualification that aligns sufficiently with the requirements of the occupation; or
2. The post-school education and training (PSET) sector is not producing enough graduates for a given qualification.

These reasons reveal two important factors that will determine the efficiency of domestic production. Firstly, the higher the degree of competence required, the longer it will take to address the shortage domestically. An occupation that requires a high degree of technical or professional competence will require more time to update the content and structure of its associated academic qualification. If the qualification does not exist, the development of a new qualification will take even longer.

Secondly, a shortage will take longer to address domestically if a qualification requires a longer time to complete. The longer it takes to complete a qualification, the longer it takes between increasing enrolment and increasing the number of qualified individuals.

It is necessary to point out that “competence” is not uniquely defined in the labour analysis sphere. Because there is no all-encompassing way to define competence, there is a need to rely on signals of both technical and professional competence.

According to a review of the recommended shortage occupations list for the UK and Scotland in 2013 (MAC, 2013), formal qualifications can be used to signal professional (and sometimes technical) skills or competencies. A minimum NQF level was subsequently agreed upon. All occupations that showed signs of acute shortage and required an NQF6 or above to obtain, therefore, would be classified as “skilled occupations in shortage”.

The “cut-off” NQF level was ultimately decided by all relevant stakeholders to the list in question, weighing the evidence for and against lowering the NQF level chosen. In choosing an NQF cut-off, one runs the risk of either:

- Including some occupations that do not require sufficient expertise/competence if the NQF level is too low; or
- Excluding some occupations that do require high levels of skill if the NQF level is too high.

In noting these risks, it is important to stress that no NQF level is prescribed in the literature and can only be decided on with relevant stakeholder engagement. The same can be said of the appropriate timeframe cut-off point.

The next section moves from the conceptual to the practical. It shows how the ideas put forward in this section have been consolidated into a framework that sets out a step-by-step process for identifying those occupations most appropriate for inclusion within the CSL.

PART 4

Methodology for identifying occupations for the CSL



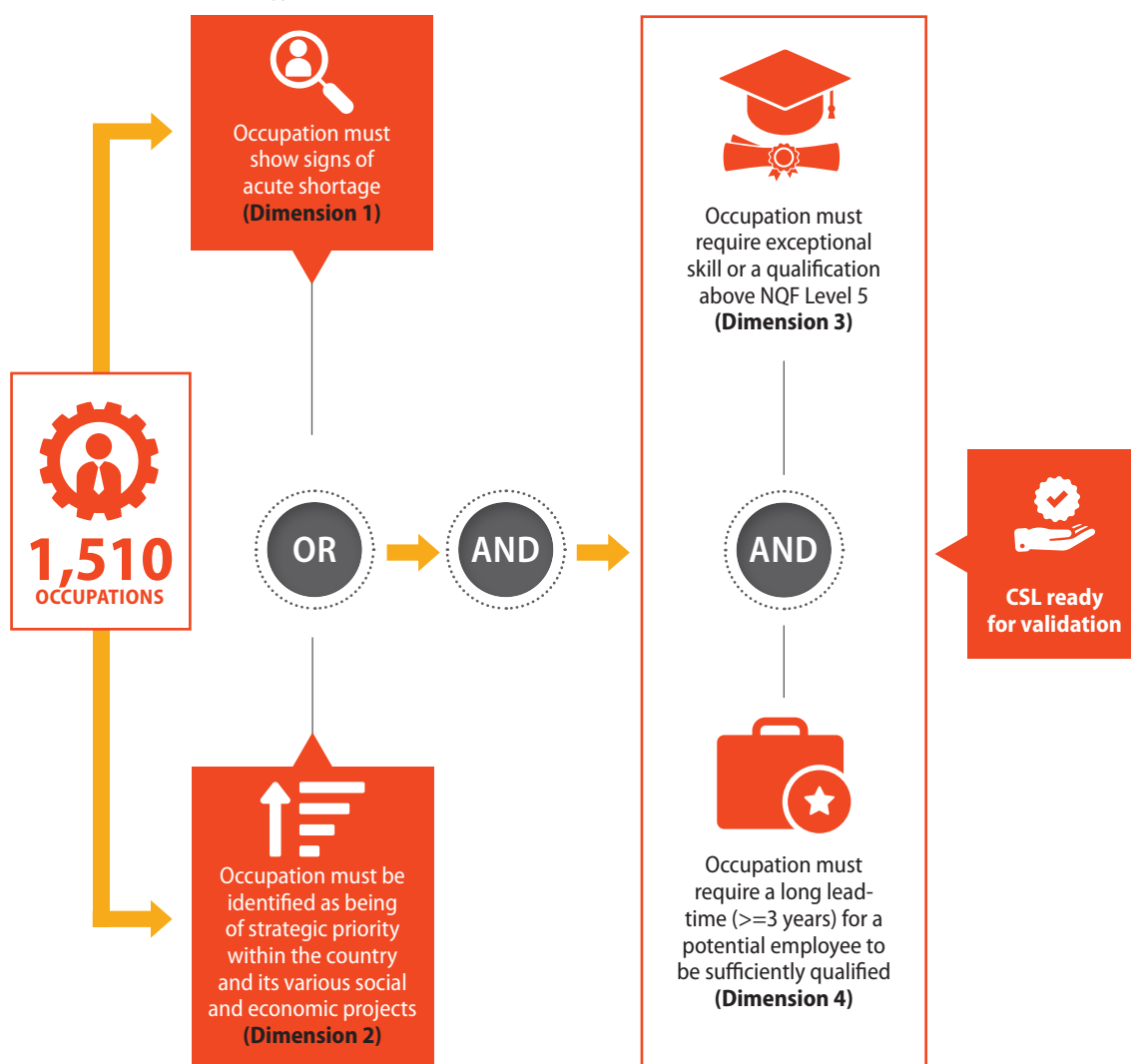
To summarise the previous sections, the criteria for identifying occupations appropriate for the CSL can be considered along four dimensions.

TABLE 2: CSL criteria dimensions

DIMENSION	DESCRIPTION
Dimension 1: Acute shortage	Convincing evidence for occupational shortage in South Africa
Dimension 2: Strategic priority	Important for strategic priorities for public and private sector investments
Dimension 3: Highly qualified or exceptionally skilled	Occupations for which workers are highly qualified or exceptionally skilled
Dimension 4: Long lead-time	Occupations that have a long lead-time to develop a supply pipeline

The OFO presents a way to discuss occupations in a very straightforward and descriptive manner. Considering this framework through the lens of the dimensions set out in Table 2 allows for a filtering approach to identifying occupations for the CSL. Figure 4 illustrates how this is done.

FIGURE 4: CSL methodology outline



Essentially, to be **included** in the CSL, an occupation:

- Must be identified as a strategic priority (D2) **or** be in acute shortage (D1); **and**
- Require workers who are highly qualified/skilled (D3); **and**
- Have a long lead-time to develop a supply pipeline (D4).

Occupations are, therefore, **excluded** from the list if any of the following is true:

- The occupation requires less than an NQF Level 5 qualification;
- The occupation is not identified as an artisanal occupation and requires less than three years' post-secondary school education and training; or
- The occupation is not listed as a strategic priority or is not an occupation in acute shortage.

The development of the CSL, therefore, happens in seven steps:

TABLE 3: Steps to developing the CSL

STEP	DESCRIPTION
Step 1	Use indicators of occupational shortage (listed below) to identify occupations in acute shortage (D1).
Step 2	Identify occupations in strategic documents.
Step 3	Consolidate lists produced in steps 1 and 2 to produce a list of occupations that are in acute shortage and/or important for South African strategic priorities.
Step 4	Extract occupations from the list produced in step 3 that require highly skilled/qualified workers (D3).
Step 5	Extract occupations from the list produced in step 5 that require a long lead-time to produce a pipeline of qualified individuals (except for artisans).
Step 6	Sense-check and validate occupations identified in step 6 to finalise the CSL.

These dimensions and associated steps are explained in the following sub-sections, prior to discussing the limitations to the methodology and the consequent importance of step 6.

4.1 Measuring dimension 1: Signalling acute shortage in skills and occupations

According to the OECD, a skills shortage:

arises when employers are unable to recruit staff with the required skills in the accessible labour market, and at the going rate for pay and working conditions due to a lack of an adequately skilled workforce. (OECD, 2016, p. 29)

As discussed in section 3.1, due to the challenges of only looking at the supply–demand differential, it is crucial to look at measuring shortage with indirect means and direct means alike. Table 4 sets out the indicators for each of the measures, along with additional information on their construction and their respective sources of the data.

TABLE 4: Indicators of acute shortage

SUB-DIMENSION	SOURCE	INDICATOR	STATISTICAL THRESHOLD ⁴
HTFVs	Career Junction	The growth rate of the number of vacancies that take longer than six months to fill	=1 if growth > median, otherwise 0
		The proportion of vacancies that take longer than six months to fill	=1 if proportion > median, otherwise 0
		The proportion of vacancies re-advertised within the year	=1 if proportion > median, otherwise 0
Vacancy growth	Career Junction	Change in vacancy growth	=1 if change > median, otherwise 0
Supply–demand	Career Junction	Demand (active candidates per OFO code) exceeds supply (employer adverts) over the past 12 months	=1 if demand > supply, otherwise 0
Wage pressure	QLFS/LMDS	Hourly mean wage growth	=1 if growth > median, otherwise 0
		Hourly median wage growth	=1 if growth > median, otherwise 0
		Conditional hourly mean wage growth	=1 if growth > median, otherwise 0
Employment pressure	QLFS	Employment intensity growth	=1 if growth > median, otherwise 0

As per the OECD and MAC methodologies, these indicators are combined to construct a multi-dimensional index of occupational shortage.

This index score is constructed by assigning either a zero or one to each of the indicators based on whether the occupation satisfies the **statistical threshold**. In all cases, this threshold is the median value across all unit groups. The formula below shows how the index score for each unit group is calculated.

EQUATION 1: Formula for calculating multi-dimensional index of occupational demand

$$\text{Index score for each unit group} = \sum_{i = \text{employment growth}}^{\text{Strategic sectorial priority}} w_i s_i$$

w_i = weight assigned to indicator i
 $s_i = 1$ if **statistical threshold** of indicator i satisfied
 $s_i = 0$ if **statistical threshold** of indicator i not satisfied

⁴ If an occupation shows evidence that there is above-median growth of HTFVs, then the occupation receives a value of 1 for that specific indicator. This “1” indicates that the occupation shows a signal of high-growth in the number of HTFVs, which is a signal of occupational shortage. This is done across all nine indicators, based on all relevant criteria.

Because it is not apparent whether any one of these indicators is more or less important than the other, the choice was made to use principal component analysis (PCA) to statistically calculate weights rather than subjectively assigning them.

PCA is a statistical technique that uses the relationships between the variables (indicators) to estimate the most appropriate weights. It does this in a way that aims to reduce the impact of high correlations between indicators on our estimation of occupational shortage. In addition to being an objective means of weighting indicators, this methodology, therefore, creates weights that correct for the relationship between variables (ensuring that the index estimated does not rely too heavily on one type of indicator or one dimension).⁵

Referring back to “acuteness”, occupations were seen to be in “acute shortage” if this index value, once ranked from largest to smallest, exceeded the 90th percentile of index scores.

4.2 Measuring dimension 2: Occupations as strategic priority

To understand whether an occupation or skill is “of strategic priority”, a host of literature was analysed. The literature search revealed occupations from the following sources:

TABLE 5: List of strategic priority documents reviewed

STRATEGIC GROUPING	DOCUMENT NAME	PUBLICATION YEAR
Priority sectors of government	The South African Poultry Master Plan	2019
	The South African Retail-Clothing, Textiles, Footwear, and Leather Value Chain Master Plan 2030	2019
	Digital Skills Strategy South Africa	
	Geared for Growth: South Africa’s Automotive Industry Masterplan to 2035	2018
	Coega: Development Corporation: Sustainable Growth Strategy 2015–2020	2015
Special economic zone (SEZ) projects	Dube Tradeport Corporation: Strategic Plan 2015/16–2019/20	2015
	Richards Bay Industrial Development Zone Strategic Plan 2017/18–2021/22	2017
	Ntinga O.R. Tambo Development Agency SOC Strategic Business Plan 2018/19–2021	2018
	Proposed SEZ Occupation for Tubatse	2020
	Saldanha Bay IDZ submission for OIHD call for evidence (CFE) 2020	2020

⁵ For example, both mean and median wage growth are highly-correlated with one another.

STRATEGIC GROUPING	DOCUMENT NAME	PUBLICATION YEAR	
Phakhisa projects	Operation Phakhisa skills development roadmap for the Offshore Oil and Gas Industry in South Africa	2015	
	List of Skills Development Initiatives in Operation Phakisa Labs		
	Phakhisa Aquaculture		
Reports on provincial and local strategies	Free State Master Skill Plan 2017–2020	2017	
	Gauteng Province Master Skills Plan 2	2017	
	KZN Provincial Growth and Development Strategy and Plan	2018	
	KZN Master Skills Plan 2017–2020	2017	
	National Skills Authority: Presentation to the Limpopo Premier’s Employment and Growth Advisory Council (PEGAG)’s Industrial and Enterprise Development Technical Working Group (TWG)	2018	
	Mpumalanga Provincial Skills Plan 2019–2030	2019	
	Northern Cape HRD and Skills Development Strategy 2016/17–2029/30	2016	
	North West Provincial Skills Plan 2019–2020	2019	
	Western Cape Provincial Government Strategic Plan 2014–2019	2014	
	Stakeholder inputs from CFE	Record of comments received from members of the public regarding whether occupations are critical for the development of the country	2020
	Research	LMIP National Paper on Skills Agro-processing 2012 National Policy Framework on the development of small and medium agro-processing enterprises in South Africa 2015 Agriculture Policy Action Plan	2020
SETA PIVOTAL lists	AgriSETA PIVOTAL list	2018/19–2019/20	
	BANKSETA PIVOTAL list		
	MQA PIVOTAL list		
	SASSETA PIVOTAL list		
	Services SETA PIVOTAL list		
	W&R SETA PIVOTAL list		
	TETA SETA PIVOTAL list		
	PSETA PIVOTAL list		
	CATHSSETA PIVOTAL list		
	CETA PIVOTAL list		
	CHIETA PIVOTAL list		
EW SETA PIVOTAL list			

STRATEGIC GROUPING	DOCUMENT NAME	PUBLICATION YEAR
SETA PIVOTAL lists <i>continued</i>	ETDP SETA PIVOTAL list	2018/19–2019/20
	Fasset PIVOTAL list	
	FoodBev SETA PIVOTAL list	
	FP&M SETA PIVOTAL list	
	INSETA PIVOTAL list	
	LGSETA PIVOTAL list	
	HWSETA PIVOTAL list	
	merSETA PIVOTAL list	
	MICT SETA PIVOTAL list	

“Strategic priority” in this context meant that an occupation would either have had to:

1. Appear on PIVOTAL (professional, vocational, technical, and academic learning) lists across various Sector Education and Training Authorities (SETAs). These occupations are identified, per economic sector, as being able to assist the country in meeting its industry skills needs; or
2. Appear on SEZ documents, provincial priority documents, government master plans, the DHET’s CFE, and other grey literature sources at least three times individually. These occupations and skills are identified as a strategic priority, given the government’s mandate to create employment and develop infrastructure in specially designated areas within the country.

If either of these criteria were met, the occupation was said to be of strategic priority.

4.3 Measuring dimensions 3 and 4: Professional or technical competence and long lead-times

An occupation that passes through either dimension 1 (D1) or dimension 2 (D2)⁶ is further analysed by answering the following two questions:

DIMENSION 3: “Does an occupation require a sufficient level of professional or technical competence?”

and

DIMENSION 4: “Does an occupation require a long lead-time (three years or more) to cultivate the relevant education or experience before a candidate employee can apply for the occupation?”

⁶ In order to be thorough, robustness checks were performed on the list of occupations that passed either D1 or D2. Specifically, these robustness tests related to reweighting the index of acute shortage and assessing whether or not occupations fell off of the list based on whether the weighting technique was altered. As is shown in the appendices of the report, of the 357 occupations that have passed either D1 or D2, a further 34 were excluded by using the PCA weighting scheme over equally weighting indicators. Therefore, the overlap between methodologies is extremely significant.

For an occupation to have “passed” dimension 3 (D3), the occupation would either:

1. Require an NQF Level 5 or above; or
2. Be included in the government gazette (DHET, 2012) outlining artisanal trades.

Instead of running through each occupation, a sieve method was applied to occupations passing D1 or D2, which consisted of the following logical tests:

TABLE 6: Logical filter for passing dimension 3

Most occupations within OFO major groups 1, 2, or 3 require an NQF Level 6 qualification or above. This was the case for all occupations save for the following occupational groups:

- 1113: Traditional chiefs and heads of villages
- 3241: Athletes and sports players
- 3439: Artistic and cultural associate professionals
- 333402: Real estate agents
- 3334301: Secretary bargaining council
- 334302: Personal assistants

The qualifications of all employees within the South African Quarterly Labour Force Survey (QLFS) were assessed for OFO major groups 4, 5, 6, and 7. The NQF level of the majority of employees per specific occupation was taken as the qualification required for that occupation.

- If an occupation was found in the government list of artisans, it was seen to require exceptional practical skill.

All occupations within the OFO major group 8 require NQF Level 2 or below.

Once occupations passed through the D3 criterion, a desktop review was done to assess the length of time it takes to qualify or be trained for each particular occupation.⁷ All occupations that took three or more years to prepare for, according to dimension 4 (D4), were understood to require a long lead-time.

4.4 Validation

4.4.1 Why validation is required

The methodology set out above follows best-practice protocols. This is true because:

1. It applies a “mixed-methods” approach (i.e., mixes relevant quantitative and qualitative evidence);
2. It is transparent (there is an available argument for the inclusion and exclusion of any occupation included on the list);
3. It uses relative measurements of demand (as per the suggestion of the OECD’s Skills for Jobs approach);
4. It covers the dimensions of the occupational demand and shortage used by the UK’s MAC methodology; and
5. It uses cumulative evidence to identify occupations in high demand.

⁷ The criteria for D4 were not applied to occupations in the government gazette of artisans. It was also assumed that all occupations that require NQF6 or above qualifications would immediately pass the criterion for D4, given that these qualifications require at least three years of post-school education.

An important sixth way in which the methodology endeavours to adhere to best practice, and thereby produce an accurate list of occupations in high demand, is validation. As mentioned before, the labour market is always moving and shifting demand from one occupation to the next as economic forces play out and strategic directions change. Furthermore, it is also accepted that the data used (both qualitative and quantitative) has its shortcomings. These realities make the validation process essential. More specifically, the following shortcomings exist:

TABLE 7: Limitation–impact–mitigation (LIM) summary of the CSL

LIMITATION	POTENTIAL IMPACT ON DRAFT CSL	MITIGATION STRATEGY
Dimension 1		
Data for D1 is at the four-digit OFO level. The occupational shortage index is therefore assumed to be the same for all matching six-digit occupations, which fall under the relevant four-digit unit group.	Some occupations proposed in the six-digit draft CSL might not be in acute shortage.	Validation with stakeholders, in both the public and private sectors, has sense-checked whether an occupation is necessarily in acute shortage or not. Those six-digit occupations that are not in acute shortage will have been left off of the final CSL based on stakeholder engagement.
Some data sources (Career Junction, specifically) tend to be biased towards the inclusion of professional and management level positions, given the nature of the data source.	Occupations that pass D1 might not adequately represent other OFO major categories.	Instead of forcing occupations to pass both D1 and D2, they should instead pass D1 or D2. Those occupations that are not professional tend to surface in the literature analysis (D2), ensuring representativity of occupational major groups across the board.
Some data within the QLFS specifically has a two-year lag, given the availability of updated data.	Some signals that occur in 2018 might not translate to 2020, biasing the draft CSL list.	Stakeholder validation with various social partners ensures that occupations that appear on the CSL are, indeed, still in shortage.
Dimension 2		
Documents reviewed in the literature analysis do not always specify occupations but sometimes mention skills.	The match between priority documents and occupations might contain some overlap (many skills may match to one occupation, or many occupations might match to one occupation). This increases the size of the draft CSL.	Wide stakeholder validation ensures that all occupations that do not pertain to government strategic priority will be dropped off of the CSL when finalised.

LIMITATION	POTENTIAL IMPACT ON DRAFT CSL	MITIGATION STRATEGY
Dimensions 3 and 4		
NQF levels and relevant lead-times are not always straightforward to confirm. Different employers sometimes require different qualifications or levels of proficiency to appoint a candidate to a particular occupation.	Some occupations that might not require technical or professional competence might be included in the draft CSL unnecessarily.	Wide stakeholder validation ensures that all potentially unnecessary occupations that do not exhibit high levels of competence or take long lead-times to foster will be dropped off of the list.

4.4.2 Validation processes

The validation process can technically be considered part of the qualitative analysis. The goal is to review evidence for the purpose of including or excluding an occupation.

Six channels of validation were employed:

1 “Highest priority” sectors

While the filtering methodology explicitly considered strategic priorities, this analysis was very broad and drew from many sources. Therefore, if an occupation was included in the draft lists, but the validation process provided no substantiating evidence, it would only be included if it was considered essential for South Africa’s priority sectors.⁸

2 Social partners of the Job Summit

On 25 June 2020, the DHET presented the methodology to the social partners of the Job Summit with representation from business, labour, and community. After the workshop, the CSL was provided to the partners for comments. The formal request was that partners would validate the list by identifying occupations that had been included but should not have been, and those that had not been included but should have been. Reliable evidence and a strong argument were required in any instance where occupations were identified for inclusion or exclusion.

3 “Sensibility” filtering

Some occupations identified by the methodologies may not be sensible to include given the respective purposes of the CSL. For this reason, the lists are reviewed and tested against specific sensibility criteria. Occupations were excluded if they fell into one of the following categories:

1. Government management positions;
2. Special talent occupations (for example, musicians and artists);
3. Non-developmental related occupations (for example, athletes); or
4. Occupations that passed through the initial round of filtering mandated by legislation or executive order to exclusively employ South African nationals.

This “sensibility” filter was guided by the methodology outlined by the MAC (2013), which conducted a similar form of filtering.

⁸ As per the MTSF, Economic Recovery Plan, and the IPAP.

4 Analysing index score cut-offs

The index score calculated for the CSL ranked occupations according to the occupational shortage. Index scores are relative scores, meaning that the score of one occupation should only be interpreted in relation to the score of another. It is the difference in the scores that is important rather than the score of a single occupation by itself. Large drops between consecutively ranked occupations can, therefore, point to acuteness-categories of shortage.

5 Follow-up with industry representatives

The researchers' understanding of the South African economy and labour assisted them in identifying anomalies in the draft list. For these occupations, telephonic interviews were organised with industry representative bodies to understand whether these occupations should indeed be included. These interviews consisted of the researcher explaining the exact purpose of the list, asking the interviewee whether the inclusion of a particular occupation on the list was appropriate, and, finally, seeking a satisfactory explanation for the answers the interviewee provided. E-mails that offered engagement with industry representatives were also sent out in the form of virtual presentations with opportunities for questions, answers, and comments.

6 DHA validation

The researchers presented the methodology to the DHA for comment and validation. The preliminary list was subsequently also provided for comment. At the time of drafting this technical report, comments had not been received. However, as mentioned in the introduction, the list produced at the end of this report is not final. It is absolutely necessary that it should go through an internal, but transparent, DHA process that reduces the list to an optimal number of occupations that can ultimately be gazetted.

4.4.3 The impact of the COVID-19 pandemic

While the limitations described above have been mitigated, the largest limitation to the development of the CSL has been an exogenous shock to the economic system due to COVID-19.

The COVID-19 pandemic will have a paradigm-shifting impact on the South African economy. Besides its overall economic shock, the pandemic is likely to fundamentally change the composition of the South African economy. This means that previously strong industries might struggle while previously weaker industries might thrive. Exactly how this will happen is still highly uncertain. The best we can do at this point is to provide some indication of the high-level impact on sub-sectors in the economy. However, there is not enough certainty to remove or add any occupations purely based on the potential changes the pandemic might bring about. Indeed, until the pandemic is over, the jury is still out. The impact of COVID-19 was, therefore, not explicitly used to compile the list. Except for cases in which industry representatives specifically argued for an occupation's inclusion or exclusion based on COVID-19 considerations, the methodology itself did not consider it.

The potential impact of the pandemic cannot, however, be ignored. It is possible to trace every occupation down to its primary (and secondary, if the occupation is transversal) economic sector(s). While the impact of demand at an occupational level is difficult to determine, myriad research points out that sectoral growth has a direct and positive association with sectoral employment. (See, for example, Mistra & Suresh, 2014, or Deepankar & Das, 2015, who estimate the linkage between output growth and employment growth in India and the US. For a similar discussion for South Africa, see Onakoya & Seyingbo, 2020). We have therefore opted to colour-code occupations according to the potential impact of the pandemic on the occupation's primary sector. The user of the list should, therefore, only see this colour-coding as a signal within the context of significant economic uncertainties. The following literature analysis breaks down the potential economic impact of COVID-19 at a sectoral level:

TABLE 8: Impact of COVID-19 at a sectoral level in South Africa

SUB-SECTOR	DEMAND IMPACT	SUPPLY IMPACT	ABILITY TO RECOVER POST-PANDEMIC
Accommodation and food services	A significant decline in demand for accommodation and food services is expected, given stifled international travel (Mail & Guardian, 2020).	Supply of accommodation and food services is heavily restricted during all levels of lockdown, under pandemic safety regulations (Moodley, 2020).	Slow to recover, if at all, to pre-COVID levels. The negative impact of the COVID-19 pandemic is expected to last up to 18 months for this industry. Both GDP and labour demand stemming from this sector is expected to decline drastically (Moodley, 2020).
Agriculture, forestry, and fishing	Domestic demand will be relatively unchanged, given that the food value chain remains fully operational (Mail & Guardian, 2020), and the demand for food is price inelastic (Lin, 2019). However, this sector is not impervious to a change in consumption habits brought on by lower levels of disposable income, which is a probable result of the general slow-down in economic activity. There may, therefore, be a slight dip in domestic demand for this sector's services and goods (Parkin et al., 2012).	The entire food value chain remained at full capacity during the national lockdown, including the export and import of critical agriculture commodities (Ministry of Agriculture, Land Reform and Rural Development Republic of South Africa, 2020). The benefits from the decrease in fuel prices (supply price effect) may, however, be offset by lowered levels of domestic demand (demand income effect) (Parkin et al., 2012).	A relatively quick recovery is expected subject to supply and demand constraints, given South Africa's self-sufficient food supply (Ministry of Agriculture, Land Reform and Rural Development Republic of South Africa, 2020). GDP and employment contributions from this sector are expected to remain relatively unchanged.
Construction	Labour and consumption demand for this sector is expected to decrease persistently as construction services are set to resume post-lockdown in South Africa. It is also likely that depressed income reduces the demand for infrastructure development in the country (Cokayne, 2020).	Supply of construction services was restricted severely during the first three levels of lockdown, under pandemic safety regulations (Cokayne, 2020).	The sector is forecasted to remain at a negative growth rate for 2-3 years post lockdown. COVID-19 is likely to have a lasting negative impact on employment levels (Cokayne, 2020). However, South Africa's economic recovery plan is likely to give infrastructure projects high priority. If implementation is successful, a faster recovery is possible. ⁹

⁹ The details of the Economic Recovery Plan have not been made public and the current recovery time projection, therefore, is not changed.



SUB-SECTOR	DEMAND IMPACT	SUPPLY IMPACT	ABILITY TO RECOVER POST-PANDEMIC
Education	<p>The education sector will be negatively affected in terms of quality, access, and investments during the pandemic (Nyariki, 2020). In instances where electronic learning can be achieved, demand will remain relatively unchanged for educational services. However, vulnerable communities will most likely be deprived of their socio-economic right to education, inadvertently depressing their demand (Veriava, 2020).</p>	<p>In instances where electronic learning can be achieved, supply should remain relatively unchanged. However, some institutions of education negatively impacted by COVID-19 might not be able to re-open unless backed by the state (Ozili & Arun, 2020).</p>	<p>A moderate to fast recovery is expected, given that this sector is still partly operational during the lockdown.</p> <p>Job security will be relatively high because education is deemed a necessity purchase, and interventions into the education space will likely be backed by the state to ensure that places of learning do not close down or shed jobs unnecessarily.</p>
Financial and insurance activities	<p>From one perspective, the banking and insurance industries are in a stronger position to combat the perverse effects of the COVID-19 pandemic given their policy response to the 2008 financial crisis, which has resultantly led to an increase in capital and liquidity buffers. On the other hand, the financial sector is not wholly withdrawn from collapse. The overall macro-economic slow-down is expected to increase the number of non-performing loans, exposing financial institutions to higher credit risks. The decline in banking transactions during the lockdown compromises sector revenue and, unfortunately, the increased demand for online purchases is not sufficient to compensate for this loss given that a significant number of sectors remain less than fully operational (Ozili & Arun, 2020).</p>	<p>Business service sector shows a promising ability to adjust their regular course of business towards a “working from home” solution during the lockdown (Konings, 2020). For this reason, supply may be relatively unchanged.</p>	<p>The financial sector recovery is a function of related sector recovery. Profits are affected by increasing credit impairments, lower interest rates, more moderate client activity, debt relief policies, and subdued loan growth. Asset quality, while being traditionally resilient, is expected to deteriorate in light of widespread industry disruption (Business Tech, 2020).</p> <p>For this reason, recovery is expected to be moderate.</p>

SUB-SECTOR	DEMAND IMPACT	SUPPLY IMPACT	ABILITY TO RECOVER POST-PANDEMIC
Human health and social work	Human demand for healthcare is infinite but driven by health status (Randhawa, 2009). In this light, the need for primary healthcare is expected to increase in response to the global pandemic (Ongole et al., 2020).	Undersupply and scarcity of resources generally characterise this sector. The global pandemic will further stretch the limits of these resources. Even though the supply of health goods and services is fixed in the short-term, increases in demand will lead to situations of great undersupply (Ongole et al., 2020).	The recovery associated with this sector is expected to be relatively fast, given the nation's reliance on the sub-sector in light of the pandemic. Subject to supply constraints, employment in this sector is expected to increase.
Manufacturing	This sector is faced with an initial decline in demand, which can be expected to recover post-level-four of lockdown, when it is permissible for the sub-sector to operate at capacity (South African Government, 2020).	Supply is decreasing as a result of delays in the amount of raw and intermediate materials being imported. This sector is heavily dependent on inputs from South Korea, Italy, and China. Supply chain disruptions and the decline in demand lead to cost-cutting solutions that extend toward the shortening of working hours and the laying off of staff (Konings, 2020).	A slow recovery is expected for the manufacturing sector. The global pandemic will result in under-employment and declining growth levels for this sector, due to subdued imports.
Mining and quarrying	Lower demand is experienced in this sector despite the increases in demand for gold as an investment haven. There is a decrease in the international demand for Africa's raw materials and commodities due to embargos on various import lines across the world (Global Compliant News, 2020). Demand for platinum has also decreased sharply due to the paralysed automotive industry (CNBC, 2020).	The mining sector was set to operate at a maximum of 50% of productive capacity during the nationwide lockdown. However, income lost from these lockdown activities might likely force some smaller mining and quarrying operations out of the market, decreasing supply (Mining Technology, 2020).	A moderate recovery is expected once related industry demand recovers and once trade of minerals opens up more substantially.



SUB-SECTOR	DEMAND IMPACT	SUPPLY IMPACT	ABILITY TO RECOVER POST-PANDEMIC
Other services (gym, personal services, etc.)	The demand for personal services is low, given that items in this sector do not form part of the essential services permitted during the pandemic. This demand is likely to remain suppressed in future due to the nature of services being community-based (South African Government, 2020).	Supply of these services has decreased as items in this sector do not form part of the essential services. It is likely that, due to losses of income, some firms within this sector might remain closed, cutting supply at an aggregate level for the sector (South African Government, 2020).	Some services offered in the industry might see a slow recovery , given their communal nature (with some consumers being skittish of, for example, going to a gym with many people).
Public administration and defence	Critical government services remain operational throughout all levels of lockdown, and more services will become available as the state eases lockdown restrictions (The ILO, 2020). It is, therefore, likely that demand for government services might initially be slightly lower, but will rebound reasonably quickly.	The supply of such services had moderated during the beginning phases of lockdown, but are expected to remain somewhat constant (and will potentially increase, given the country's increased reliance on public policy responses) in the foreseeable future.	A moderate to fast recovery is to be expected , given that there is sufficient scope for a rebound and given the nature of essential government services.
Real estate, business, and administrative activities	This sector was not categorised as an essential service in both levels 4 and 5 of the national lockdown. With more and more employees working from home, the demand for corporate property could likely decline. This impact may extend beyond the pandemic. However, heavily slashed interest rates have stimulated demand for home buyers. It is improbable that this increased demand will result in many home sales as the epidemic threatens household earning potential. The interest rate cuts allow consumers to keep up with debt repayments rather than pave the way for fresh investments to be made (Eyewitness News, 2020).	Supply of various properties and related property services have declined, due to the lack of businesses operating in the sector before advanced level 3 lockdown regulations (South African Government, 2020).	A slow recovery is expected. Growth and employment are expected to decline in this sector, precisely due to subdued national income, which this sector relies on tremendously.

SUB-SECTOR	DEMAND IMPACT	SUPPLY IMPACT	ABILITY TO RECOVER POST-PANDEMIC
Transport, storage, and communication	Public transport demand is lowered but not non-existent during the economic lockdown period in the country. This demand is expected to tick up slightly as more services open, although skittish consumers might vie for less public transportation services (South African Government, 2020). However, there will be an increase in the demand for data and data usage, with various forms of communication being leveraged during the crisis (Business Tech, 2020). This will likely be coupled with an increased demand for courier-based services that leverage not only on this sector but also on most other economic sectors.	Public transport supply is restricted to a 50–70% loading capacity depending on the mode of transportation during level 4 of the lockdown, cutting into the supply of public transportation services (South African Government, 2020). However, the supply of communication services has remained unchanged.	Although communications employees are unable to work from home during the lockdown, there is substantial scope for recovery in this sector, and with this, a moderate to quick improvement is expected (Konings, 2020).
Utilities	Electricity demand decreased to roughly a quarter of its usual optimal capacity in the first phase of lockdown. However, with more operations continuing in advanced stages of lockdown, demand for utilities will likely rebound (The Conversation, 2020).	Electricity production capacity has remained low, and the challenges of power shortages will remain post-pandemic due more to the weak balance sheets of state owned enterprises than the pandemic (The Conversation, 2020).	A slow to moderate recovery can be expected as this sector is dependent on mining and quarrying, specifically in terms of electricity generation. However, the water sub-utility is expected to make a relatively quick recovery, given the commodity's elastic demand and ongoing productive capacity during the lockdown.
Wholesale and retail trade	Panic-buying had increased the demand for food and other essential goods initially, and it is expected that overall demand for essentials remains elevated. The need for online shopping services has also seen a massive increase (Business Wire, 2020). However, the demand for luxury goods will be severely impacted as consumer spending becomes more constrained as a result of job losses during the pandemic.	The supply of essential items remains mostly unchanged, while the supply of non-essential items remains low during the various stages of lockdown. This is, however, only true for goods that are not embargoed in terms of imports.	Necessity goods markets will be quick to recover, versus luxury goods markets, which are expected to decline due to decreased disposable income.

If both demand and supply in a sector are expected to decline due to COVID-19, it is expected that the sector will lay off workers. If demand and supply in a sector both increase, it is expected that the sector will absorb or hire more workers. If there is evidence that suggests that the impact of COVID-19 on sectoral demand and supply growth is uncertain, there is also room to suggest that labour demand will be ambiguously impacted over the short term.

A summary of the economic and labour market impacts, as well as possible recovery times, can be found in Table 9:

TABLE 9: Potential sector-level impact of COVID-19 in South Africa

SUB-SECTOR	IMPACT OF COVID-19 ON DEMAND IN SECTOR	IMPACT OF COVID-19 ON SUPPLY IN SECTOR	POTENTIAL IMPACT OF COVID-19 ON LABOUR DEMAND	RECOVERY TIMEFRAME
Accommodation and food services	– (negative)	– (negative)	– (negative)	>3 years
Agriculture, forestry, and fishing	+/- (neutral)	+/- (neutral)	+/- (neutral)	1–2 years
Construction	– (negative)	– (negative)	– (negative)	2–3 years
Education	? (ambiguous)	+/- (neutral)	+/- (neutral)	1–2 years
Financial and insurance activities	+/- (neutral)	+/- (neutral)	? (ambiguous)	1–2 years
Human health and social work	+ (positive)	– (negative)	+ (positive)	6–12 months
Manufacturing	– (negative)	– (negative)	– (negative)	2–3 years
Mining and quarrying	– (negative)	– (negative)	– (negative)	2–3 years
Other services (gym, personal services, etc.)	– (negative)	– (negative)	– (negative)	1–2 years
Public administration and defence	? (ambiguous)	? (ambiguous)	+/- (neutral)	6–12 months
Real estate, business, and administrative activities	– (negative)	– (negative)	– (negative)	2–3 years
Transport, storage, and communication	? (ambiguous)	? (ambiguous)	+ (positive)	1–2 years
Utilities	– (negative)	– (negative)	+/- (neutral)	2–3 years
Wholesale and retail trade	+ (positive)	? (ambiguous)	? (ambiguous)	6–12 months

In some instances, there is insufficient evidence to conclude that a sector will employ more or fewer people post-COVID-19. However, it is often the case (except for the health and ITC industries) that the literature posits that demand for labour will decrease due to COVID-19. This is potentially due to cost-cutting measures such as retrenchments, which are relied upon by various entities as a means to stave off bankruptcy.

It is the “speed of recovery” per sub-sector that dictates how long the change in labour demand is likely to last for:

- If a sector is stated as being **quick** to recover, recovery in labour demand to pre-COVID levels (or thereabouts) will take between 6 and 12 months;
- If a sector is stated as taking a **moderate to quick** amount of time to recover, the recovery of labour demand to pre-COVID levels is estimated to take between one and two years;
- If a sector is deemed to take a **slow to moderate** amount of time to recover, the industry (and labour demand within that sector) would only reach pre-COVID levels in two to three years;
- If a sector is shown to have a **slow** recovery, labour demand is likely to only recover partially in the short term, with pre-COVID levels of labour demand only occurring after three years.

This information is utilised in presenting the final CSL through the use of colour codes.

An occupation is:

Highlighted in **green** if the sector within which an occupation is housed is expected to:

- Recover relatively quickly from the impact of COVID-19; or
- Show signals of increased labour demand due to COVID-19.

Highlighted in white/not highlighted if the sector within which an occupation is housed is expected to:

- Recover from the impact of COVID-19 in a moderate timeframe; or
- Labour demand is expected to be ambiguously affected by COVID-19 in the sector; or
- Labour demand is not expected to change due to the impact of COVID-19.

Highlighted in **red** if the sector within which an occupation is housed is expected to:

- Recover slowly from the impact of COVID-19; or
- Show signals of decreased labour demand due to COVID-19.

The next section will present first the quantitative and then the qualitative analysis. The colour-coding indicated above will only be employed in the presentation of the final list in section 6.



PART 5

Analysis of results

5.1 Step 1: Analysis of dimension 1: Signalling acute shortage in skills and occupations

The list of occupations that are in acute shortage based on the index of indicators in Table 1¹⁰ is summarised in Table 10:

TABLE 10: Occupations in acute shortage

6-DIGIT OFO CODES	6-DIGIT OFO DESCRIPTIONS
2019-122301	Research and development manager
2019-134501	School principal
2019-134502	FET college principal
2019-134503	Faculty head
2019-134504	District education manager
2019-134505	Educational rector
2019-134506	Educational registrar
2019-134507	Departmental head
2019-141201	Café (licensed) or restaurant manager
2019-141202	Licensed club manager
2019-141203	Catering production manager
2019-141204	Reservations manager
2019-142101	Importer or exporter
2019-142102	Wholesaler
2019-142103	Retail general manager
2019-142104	Post Office manager
2019-143901	Facilities manager
2019-143902	Cleaning services manager
2019-143903	Boarding kennel or cattery manager
2019-143904	Security services manager
2019-143905	Call or contact centre manager
2019-143906	Caravan park and camping ground manager
2019-143907	Dockmaster
2019-143908	Travel accommodation inspector
2019-143909	Travel agency manager
2019-216101	Architect
2019-216601	Digital artist
2019-216602	Illustrator

¹⁰ HTFVs; employment intensity; wage pressure; supply-demand; vacancy growth.

6-DIGIT OFO CODES	6-DIGIT OFO DESCRIPTIONS
2019-216603	Multimedia designer
2019-216604	Web designer
2019-241101	General accountant
2019-241102	Management accountant
2019-241103	Tax professional
2019-241104	External auditor
2019-241106	Accountant in practice
2019-241107	Financial accountant
2019-241108	Forensic accountant
2019-242101	Management consultant
2019-242102	Organisation and methods analyst
2019-242103	Business development officer
2019-242104	AML surveillance analyst
2019-242201	Intelligence officer
2019-242202	Policy analyst
2019-242203	Company secretary
2019-242204	Corporate treasurer
2019-242207	Compliance officer
2019-242208	Organisational risk manager
2019-242209	Accounting officer
2019-242210	Business administrator
2019-242211	Internal auditor
2019-242212	Diplomat
2019-242213	Regulatory affairs officer
2019-242214	Intellectual property special advisor
2019-242215	Fraud examiner
2019-243101	Advertising specialist
2019-243102	Market research analyst
2019-243103	Marketing practitioner
2019-243104	Market campaign analyst
2019-243201	Communication coordinator
2019-243202	Communication strategist
2019-243203	Corporate communication manager
2019-243204	Event producer
2019-243301	Industrial products sales representative

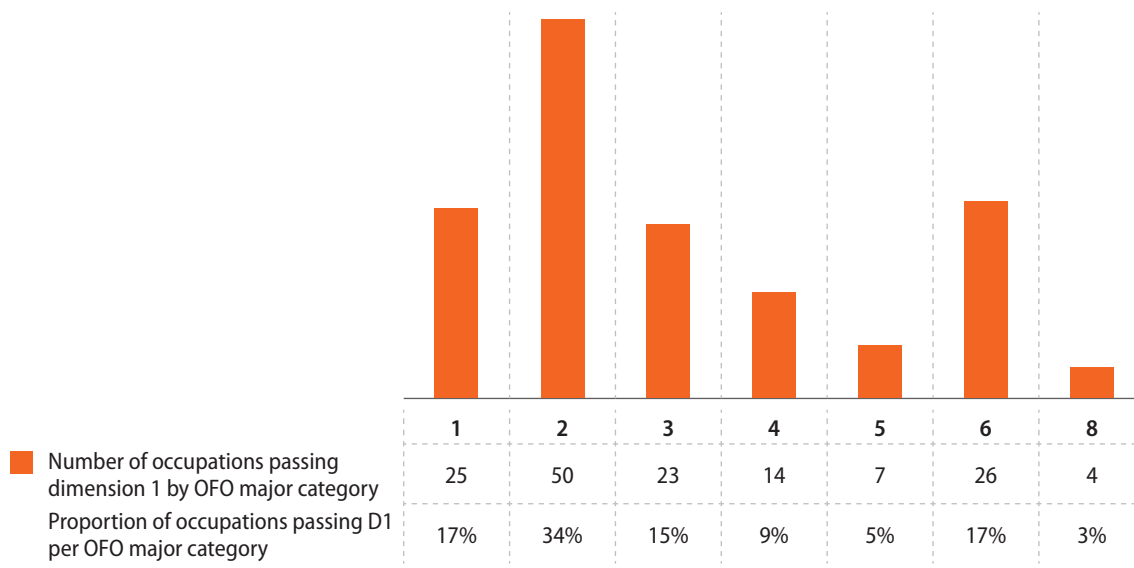
6-DIGIT OFO CODES	6-DIGIT OFO DESCRIPTIONS
2019-243302	Medical and pharmaceutical sales representative
2019-243303	Educational products and services sales representative
2019-243304	Printing and publishing equipment sales representative
2019-251101	ICT systems analyst
2019-251102	Data scientist
2019-251201	Software developer
2019-251202	Programmer analyst
2019-251203	Developer programmer
2019-251301	Multimedia specialist
2019-251302	Web developer
2019-251901	Computers quality assurance analyst
2019-252101	Database designer and administrator
2019-331201	Credit or loans officer
2019-331204	False worker
2019-331205	Business banker
2019-331301	Bookkeeper
2019-331302	Accounting technician
2019-331303	Tax technician
2019-331401	Statistical and mathematical assistant
2019-332101	Insurance agent
2019-332102	Insurance broker
2019-332201	Commercial sales representative
2019-332202	Sales representative (building and plumbing supplies)
2019-332203	Sales representative (personal and household goods)
2019-332204	Commercial services sales agent
2019-332205	Manufacturers representative
2019-332206	Sales representative (photographic equipment and supplies)
2019-332207	Chemical sales representative
2019-332208	Pharmacy sales assistant
2019-334301	Secretary bargaining council
2019-334302	Personal assistant
2019-343401	Chef
2019-351301	Computer network technician
2019-351302	Geographic information systems technicians
2019-351303	Marine GIS technician

6-DIGIT OFO CODES	6-DIGIT OFO DESCRIPTIONS
2019-413201	Data entry operator
2019-422101	Tourist information officer
2019-422102	Travel consultant
2019-422201	Inbound contact centre consultant
2019-422202	Outbound contact centre consultant
2019-422203	Contact centre real time advisor
2019-422204	Contact centre resource planner
2019-422205	Contact centre forecast analyst
2019-422206	Call or contact centre agent
2019-422501	Enquiry clerk
2019-431101	Accounts clerk
2019-431102	Cost clerk
2019-431103	Taxation clerk
2019-432301	Transport clerk
2019-522201	Retail supervisor
2019-522301	Sales assistant (general)
2019-522302	Motorised vehicle or caravan salesperson
2019-522303	Automotive parts salesperson
2019-522304	ICT sales assistant
2019-524201	Sales demonstrator
2019-524401	Call centre salesperson
2019-652301	Metal machinist
2019-652302	Fitter and turner
2019-653301	Industrial machinery mechanic
2019-653302	Mechanical equipment repairer
2019-653303	Mechanical fitter
2019-653304	Diesel fitter
2019-653305	Small engine mechanic
2019-653306	Diesel mechanic
2019-653307	Heavy equipment mechanic
2019-653308	Tractor mechanic
2019-653309	Forklift mechanic
2019-653310	Lubrication equipment mechanic
2019-671101	Electrician
2019-671102	Electrical installation inspector

6-DIGIT OFO CODES	6-DIGIT OFO DESCRIPTIONS
2019-671202	Millwright
2019-671203	Mechatronics technician
2019-671204	Lift mechanic
2019-671205	Weapon systems mechanic
2019-671206	Electrical equipment mechanic
2019-671207	Armature winder
2019-671208	Transportation electrician
2019-684301	Crop produce analyst
2019-684302	Tobacco grader
2019-684303	Cotton grader
2019-684304	Wool classer/grader
2019-684305	Quality controller (manufacturing)
2019-811201	Commercial cleaner
2019-811202	Healthcare cleaner
2019-811203	Tea attendant
2019-811204	Caretaker/cleaner

These occupations are distributed across most OFO major groups. However, the most acute shortages tend to appear in OFO major categories 1, 2, and 6, based on the index calculated using PCA.¹¹ The distribution of occupations across OFO major groups is summarised in Figure 5:

FIGURE 5: Occupations passing dimension 1 criteria by OFO major category

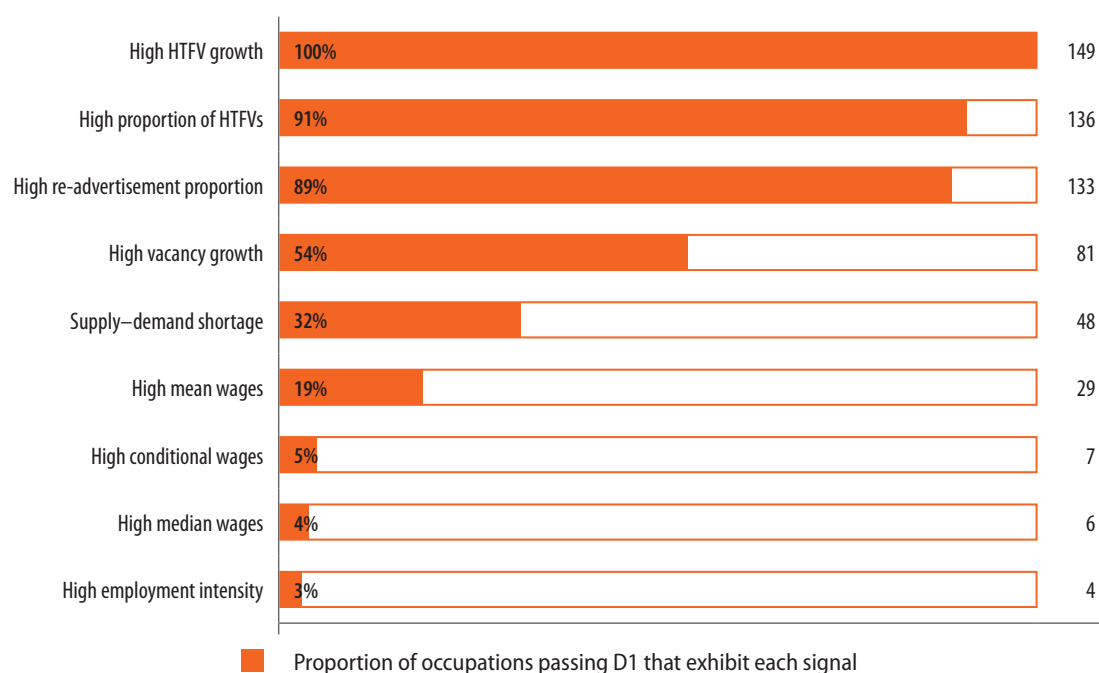


Source: Own analysis of data from Career Junction and QLFS databases

¹¹ Robustness checks that alter weighting schemes can be found in the appendices.

To “pass” D1, these occupations have each exhibited some signals of acute shortage in the labour market. The number of occupations experiencing the various signals is summarised in Figure 6:

FIGURE 6: Signal decomposition for occupations that have passed dimension 1 of the methodology



Source: Own analysis of data from Career Junction and QLFS databases

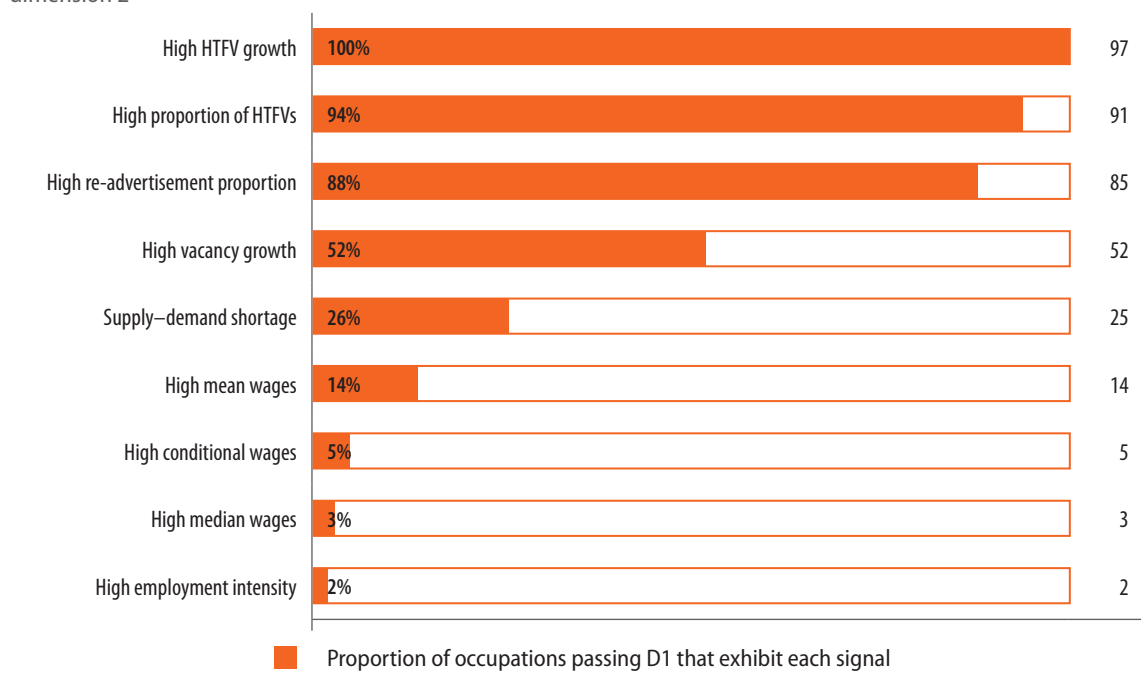
Note:

The number of occupations that have passed D1 and exhibited the signal for acute shortage is found on the right-hand side of the graphic.

Almost unsurprisingly, the set of signals that show themselves across the majority of occupations deal with HTFVs (for example, all 149 of the occupations that passed D1 showed signals of high levels of growth in HTFVs). This is unsurprising, given the literature’s focus on using HTFVs as a signal for measuring acute shortage in the labour market (Sutherland & Lodge, 2010; OECD, 2016, 2019). In contrast, only four occupations (three percent of all occupations passing D1) showed signals of high levels of employment intensity, while only six occupations exhibited high median wage pressure.

What is reassuring is that the significance of these signals remains consistent, even when looking at occupations that are not supported by the literature (analysed in D2). These signals are decomposed in Figure 7.

FIGURE 7: Signal decomposition for occupations that have passed dimension 1 of the methodology but did not pass dimension 2



Source: Own analysis of data from Career Junction and QLFS databases

Note:

The number of occupations that have passed D1 and exhibited the signal for acute shortage is found on the right-hand side of the graphic.

Again, the signals that are exhibited the most in occupations that pass D1 but not D2 (97 occupations in total) relate to HTFV pressure. On the other hand, employment intensity and median wage pressure are, again, lowest on the list of signals.

As Reddy et al. (2018) point out, there is potentially room to suggest that the list of occupations that passed D1 is statistically sound as is and does not necessitate lengthy robustness tests. Also, because there are very strong theoretical ties between each indicator and measurements of acute shortage, there is no need to drop off indicators from the measurement of D1. In their own words:

It is difficult to imagine, for example, a situation in which employment growth,¹² wage growth and vacancy growth do not send fairly similar signals for occupations which are in scarce supply or high demand in the economy. (Reddy et al., 2018, p. 44)

However, to ensure that best practice is followed, robustness analysis is still necessitated. To be prudent, the robustness check is dealt with in the appendix of the current report. There, each indicator in D1 is reweighted, and the list of occupations that pass D1 or D2 is compared to the list of occupations that pass the newly weighted D1 or D2.

12 Employment growth was used as an indicator in the methodology referred to in Reddy et al. (2018). It is however not applicable here.

5.2 Step 2: Analysis of dimension 2: Occupations as strategic priority

As mentioned previously, “strategic priority” in this context refers to an occupation that would either:

1. Appear on PIVOTAL lists across various SETAs. These occupations are identified, per economic sector, as being able to assist the country in meeting its industry skills needs; or
2. Appear on SEZ documents, provincial priority documents, government master plans, the DHET’s CFE, and other grey literature sources at least three times individually. These occupations and skills are identified as a strategic priority given the government’s mandate to create employment and develop infrastructure in specially designated areas within the country.

If either of these criteria was met, the occupation was said to be of sufficient priority to the government.

TABLE 11: Occupations as strategic priority

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-111202	General manager public service	In SETA PIVOTAL lists
2019-111204	Senior government official	In SETA PIVOTAL lists
2019-111207	Senior government manager	In SETA PIVOTAL lists
2019-112101	Director (enterprise/organisation)	Mentioned by three sources
2019-121101	Finance manager	Mentioned by 10 sources and in SETA PIVOTAL lists
2019-121103	Credit manager	Mentioned by four sources
2019-121104	Internal audit manager	Mentioned by four sources
2019-121201	Human resource manager	Mentioned by six sources and in SETA PIVOTAL lists
2019-121202	Business training manager	Mentioned by three sources
2019-121204	Recruitment manager	Mentioned by three sources
2019-121205	Employee wellness manager	Mentioned by three sources
2019-121206	Health and safety manager	Mentioned by five sources and in SETA PIVOTAL lists
2019-121207	Personnel manager	Mentioned by five sources
2019-121301	Policy and planning manager	In SETA PIVOTAL lists
2019-121901	Corporate general manager	Mentioned by three sources and in SETA PIVOTAL lists
2019-121905	Programme or project manager	Mentioned by five sources and in SETA PIVOTAL lists
2019-122101	Sales and marketing manager	Mentioned by five sources and in SETA PIVOTAL lists
2019-122102	Sales manager	Mentioned by three sources and in SETA PIVOTAL lists

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-131101	Agricultural farm manager	Mentioned by six sources and in SETA PIVOTAL lists
2019-131201	Aquaculture farm manager	Mentioned by three sources
2019-132101	Manufacturer	Mentioned by three sources
2019-132102	Manufacturing operations manager	Mentioned by three sources and in SETA PIVOTAL lists
2019-132104	Engineering manager	In SETA PIVOTAL lists
2019-132201	Mining operations manager	In SETA PIVOTAL lists
2019-132301	Construction project manager	Mentioned by five sources and in SETA PIVOTAL lists
2019-132401	Supply and distribution manager	Mentioned by six sources and in SETA PIVOTAL lists
2019-132402	Logistics manager	Mentioned by six sources
2019-132403	Road transport manager	Mentioned by three sources
2019-132404	Warehouse manager	Mentioned by three sources
2019-132407	Airport or harbour manager	Mentioned by three sources
2019-133101	Chief information officer	Mentioned by three sources
2019-133102	ICT project manager	Mentioned by six sources
2019-133103	Data management manager	Mentioned by five sources
2019-133104	Application development manager	Mentioned by five sources
2019-133105	Information technology manager	Mentioned by five sources
2019-133106	Information systems director	Mentioned by six sources
2019-134501	School principal	In SETA PIVOTAL lists
2019-134507	Departmental head	In SETA PIVOTAL lists
2019-134901	Environmental manager	Mentioned by four sources
2019-134903	Small business manager	Mentioned by five sources
2019-141201	Café (licensed) or restaurant manager	In SETA PIVOTAL lists
2019-142103	Retail general manager	In SETA PIVOTAL lists
2019-143105	Sports administrator	In SETA PIVOTAL lists
2019-143904	Security services manager	In SETA PIVOTAL lists
2019-211301	Chemist	In SETA PIVOTAL lists
2019-211401	Geologist	Mentioned by six sources
2019-211402	Geophysicist	Mentioned by six sources
2019-211403	Materials scientist	Mentioned by three sources
2019-211405	Mineralogist	Mentioned by three sources
2019-211406	Hydrologist	Mentioned by three sources

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-211407	Oceanographer	Mentioned by three sources
2019-212101	Actuary	In SETA PIVOTAL lists
2019-213109	Zoologist	Mentioned by three sources
2019-213201	Agriculture consultant	Mentioned by five sources
2019-213202	Agricultural scientist	Mentioned by seven sources and in SETA PIVOTAL lists
2019-213204	Wine maker	In SETA PIVOTAL lists
2019-213205	Food and beverage scientist	Mentioned by four sources
2019-213302	Environmental scientist	Mentioned by five sources and in SETA PIVOTAL lists
2019-213306	Water quality analyst	Mentioned by three sources and in SETA PIVOTAL lists
2019-213307	Park ranger	In SETA PIVOTAL Lists
2019-214101	Industrial engineer	Mentioned by five sources and in SETA PIVOTAL lists
2019-214102	Industrial engineering technologist	Mentioned by four sources
2019-214201	Civil engineer	Mentioned by nine sources and in SETA PIVOTAL lists
2019-214202	Civil engineering technologist	Mentioned by eight sources and In SETA PIVOTAL lists
2019-214301	Environmental engineer	Mentioned by four sources and in SETA PIVOTAL lists
2019-214302	Environmental impact and restoration analyst	Mentioned by three sources
2019-214401	Mechanical engineer	Mentioned by eight sources and in SETA PIVOTAL lists
2019-214402	Mechanical engineering technologist	Mentioned by six sources and in SETA PIVOTAL lists
2019-214403	Aeronautical engineer	Mentioned by three sources
2019-214404	Aeronautical engineering technologist	Mentioned by three sources
2019-214405	Naval architect	Mentioned by three sources
2019-214501	Chemical engineer	Mentioned by six sources
2019-214502	Chemical engineering technologist	Mentioned by six sources
2019-214601	Mining engineer	In SETA PIVOTAL lists
2019-214904	Quantity surveyor	Mentioned by five sources
2019-214905	Agricultural engineer	Mentioned by six sources
2019-214906	Agricultural engineering technologist	Mentioned by four sources
2019-215101	Electrical engineer	Mentioned by twelve sources

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-215102	Electrical engineering technologist	Mentioned by nine sources
2019-215103	Energy engineer	Mentioned by three sources
2019-215104	Energy engineering technologist	Mentioned by three sources
2019-216101	Architect	Mentioned by seven sources and in SETA PIVOTAL lists
2019-216201	Landscape architect	Mentioned by three sources
2019-216401	Urban and regional planner	Mentioned by five sources and in SETA PIVOTAL lists
2019-216502	Surveyor	Mentioned by three sources
2019-216603	Multimedia designer	In SETA PIVOTAL lists
2019-221101	General medical practitioner	Mentioned by three sources and in SETA PIVOTAL lists
2019-221203	Emergency medicine specialist	Mentioned by three sources
2019-221210	General medicine specialist physician	Mentioned by three sources
2019-221214	Nuclear medicine specialist	Mentioned by three sources
2019-221218	Medical geneticist	Mentioned by three sources
2019-221221	Public health medicine specialist	Mentioned by three sources
2019-221222	Public health occupational medicine specialist	Mentioned by three sources
2019-222103	Registered nurse (child and family health)	Mentioned by three sources
2019-222104	Registered nurse (community health)	Mentioned by three sources
2019-222108	Registered nurse (medical)	Mentioned by three sources and in SETA PIVOTAL lists
2019-222109	Registered nurse (medical practice)	Mentioned by three sources
2019-222110	Registered nurse (mental health)	Mentioned by three sources
2019-222114	Nurse educator	In SETA PIVOTAL lists
2019-225101	Veterinarian	Mentioned by four sources
2019-226201	Hospital pharmacist	Mentioned by three sources and in SETA PIVOTAL lists
2019-226202	Industrial pharmacist	Mentioned by four sources
2019-226203	Retail pharmacist	Mentioned by three sources and in SETA PIVOTAL lists
2019-226302	Safety, health, environment, and quality (SHE&Q) practitioner	Mentioned by six sources and in SETA PIVOTAL lists
2019-226401	Physiotherapist	In SETA PIVOTAL lists
2019-226905	Biokineticist	In SETA PIVOTAL lists

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-231101	University lecturer	In SETA PIVOTAL lists
2019-232130	TVET educator	In SETA PIVOTAL lists
2019-233107	FET phase school teacher (Grades 10–12)	In SETA PIVOTAL lists
2019-233108	Senior phase school teacher (Grades 7–9)	In SETA PIVOTAL lists
2019-234101	Foundation phase school teacher	In SETA PIVOTAL lists
2019-234102	Intermediate phase school teacher (Grades 4–6)	In SETA PIVOTAL lists
2019-234201	Early childhood development practitioner	In SETA PIVOTAL lists
2019-235101	Education or training advisor	In SETA PIVOTAL lists
2019-235201	Special needs teacher	In SETA PIVOTAL lists
2019-235502	Private tuition dance teacher	In SETA PIVOTAL lists
2019-241101	General accountant	Mentioned by seven sources
2019-241102	Management accountant	Mentioned by six sources
2019-241103	Tax professional	Mentioned by four sources
2019-241104	External auditor	Mentioned by four sources
2019-241106	Accountant in practice	Mentioned by four sources
2019-241107	Financial accountant	Mentioned by six sources and in SETA PIVOTAL lists
2019-241108	Forensic accountant	Mentioned by three sources
2019-241201	Investment analyst	Mentioned by four sources
2019-241202	Investment manager	Mentioned by five sources and in SETA PIVOTAL lists
2019-241203	Investment advisor	Mentioned by four sources
2019-241301	Financial investment advisor	Mentioned by five sources and in SETA PIVOTAL lists
2019-242101	Management consultant	Mentioned by three sources and in SETA PIVOTAL lists
2019-242103	Business development officer	In SETA PIVOTAL lists
2019-242104	AML surveillance analyst	In SETA PIVOTAL lists
2019-242202	Policy analyst	Mentioned by three sources
2019-242207	Compliance officer	Mentioned by three sources and in SETA PIVOTAL lists
2019-242208	Organisational risk manager	Mentioned by five sources
2019-242211	Internal auditor	In SETA PIVOTAL lists
2019-242303	Human resource advisor	Mentioned by four sources
2019-242304	Industrial relations advisor	Mentioned by three sources

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-243101	Advertising specialist	In SETA PIVOTAL lists
2019-243102	Market research analyst	Mentioned by three sources
2019-243103	Marketing practitioner	In SETA PIVOTAL lists
2019-243401	ICT account manager	Mentioned by three sources
2019-243402	ICT business development manager	Mentioned by four sources
2019-243403	ICT sales representative	In SETA PIVOTAL lists
2019-251101	ICT systems analyst	Mentioned by 11 sources and in SETA PIVOTAL lists
2019-251102	Data scientist	In SETA PIVOTAL lists
2019-251201	Software developer	Mentioned by nine sources and in SETA PIVOTAL lists
2019-251202	Programmer analyst	Mentioned by eight sources and in SETA PIVOTAL lists
2019-251203	Developer programmer	Mentioned by seven sources and in SETA PIVOTAL lists
2019-251301	Multimedia specialist	Mentioned by five sources
2019-251302	Web developer	Mentioned by five sources
2019-251401	Applications programmer	Mentioned by three sources
2019-251901	Computers quality assurance analyst	Mentioned by four sources and in SETA PIVOTAL lists
2019-252101	Database designer and administrator	Mentioned by nine sources and in SETA PIVOTAL lists
2019-252201	Systems administrator	Mentioned by three sources
2019-252301	Computer network and systems engineer	Mentioned by five sources and in SETA PIVOTAL lists
2019-252302	Network analyst	Mentioned by four sources
2019-252901	ICT security specialist	Mentioned by five sources and in SETA PIVOTAL lists
2019-262202	Information services manager	Mentioned by five sources
2019-263101	Economist	Mentioned by six sources and in SETA PIVOTAL lists
2019-263206	Heritage consultant	In SETA PIVOTAL lists
2019-263403	Organisational psychologist	In SETA PIVOTAL lists
2019-263501	Social counselling worker	In SETA PIVOTAL lists
2019-264202	Editor	In SETA PIVOTAL lists
2019-311101	Chemistry technician	In SETA PIVOTAL lists
2019-311201	Civil engineering technician	Mentioned by seven sources
2019-311217	Water control officer	Mentioned by three sources
2019-311301	Electrical engineering technician	Mentioned by eight sources and in SETA PIVOTAL lists

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-311302	Electric substation operations manager	Mentioned by four sources
2019-311501	Mechanical engineering technician	Mentioned by five sources
2019-311502	Pressure equipment inspector	Mentioned by three sources
2019-311503	Aeronautical engineering technician	Mentioned by three sources
2019-311601	Chemical engineering technician	Mentioned by five sources
2019-311801	Draughtsperson	Mentioned by six sources
2019-311903	Food and beverage technician	In SETA PIVOTAL lists
2019-311905	Industrial engineering technician	Mentioned by four sources
2019-312101	Mining production supervisor	Mentioned by three sources and in SETA PIVOTAL lists
2019-312103	Engineering supervisor	In SETA PIVOTAL lists
2019-312201	Production/operations supervisor (manufacturing)	In SETA PIVOTAL lists
2019-312301	Building associate	In SETA PIVOTAL lists
2019-313201	Water plant operator	In SETA PIVOTAL lists
2019-313907	Food and beverage manufacturing process controller	In SETA PIVOTAL lists
2019-314102	Environmental science technician	Mentioned by three sources
2019-314201	Agricultural technician	Mentioned by five sources
2019-321101	Medical diagnostic radiographer	In SETA PIVOTAL lists
2019-321201	Medical technician	In SETA PIVOTAL lists
2019-325703	Agricultural/horticultural produce inspector	Mentioned by three sources
2019-325802	Intensive care ambulance paramedic/ambulance paramedic	In SETA PIVOTAL lists
2019-332101	Insurance agent	In SETA PIVOTAL lists
2019-332201	Commercial sales representative	In SETA PIVOTAL lists
2019-332203	Sales representative (personal and household goods)	In SETA PIVOTAL lists
2019-332301	Retail buyer	In SETA PIVOTAL lists
2019-332302	Purchasing officer	Mentioned by four sources
2019-333402	Real estate agent	In SETA PIVOTAL lists
2019-333905	Supply chain practitioner	Mentioned by four sources and in SETA PIVOTAL lists
2019-335916	Gaming operations compliance officer	In SETA PIVOTAL lists
2019-343401	Chef	In SETA PIVOTAL lists
2019-343902	Light technician	Mentioned by three sources

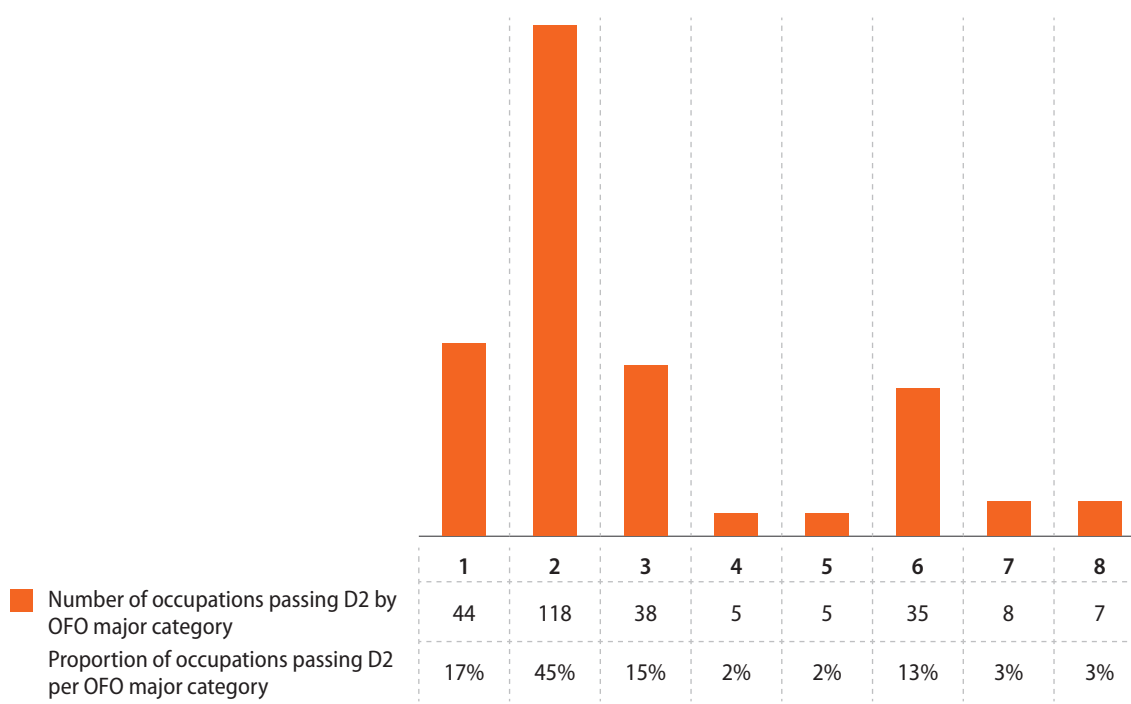
6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-351101	Computer operator	Mentioned by three sources and in SETA PIVOTAL lists
2019-351201	ICT communications assistant	Mentioned by four sources
2019-351301	Computer network technician	Mentioned by three sources
2019-351302	Geographic information systems technicians	Mentioned by six sources
2019-411101	General clerk	In SETA PIVOTAL lists
2019-421102	Bank worker	In SETA PIVOTAL lists
2019-422206	Call or contact centre agent	In SETA PIVOTAL lists
2019-441601	Human resources clerk	Mentioned by four sources
2019-441903	Programme or project administrators	Mentioned by four sources and in SETA PIVOTAL lists
2019-516301	Funeral director	In SETA PIVOTAL lists
2019-522201	Retail supervisor	In SETA PIVOTAL lists
2019-522301	Sales assistant (general)	In SETA PIVOTAL lists
2019-541401	Security officer	In SETA PIVOTAL lists
2019-541402	Alarm, security, or surveillance monitor	In SETA PIVOTAL lists
2019-611202	Horticultural farmer	Mentioned by six sources and in SETA PIVOTAL lists
2019-641201	Bricklayer	Mentioned by four sources
2019-641402	Fibre-cement moulder	Mentioned by three sources
2019-641403	Civil engineering constructor	Mentioned by five sources
2019-641501	Carpenter and joiner	Mentioned by three sources
2019-641502	Carpenter	Mentioned by four sources and in SETA PIVOTAL lists
2019-641503	Joiner	Mentioned by three sources
2019-641902	Scaffolder	Mentioned by three sources
2019-642301	Fibrous plasterer	Mentioned by three sources
2019-642302	Plasterer	Mentioned by three sources
2019-642601	Plumber	Mentioned by four sources and in SETA PIVOTAL lists
2019-642605	Plumbing inspector	Mentioned by three sources
2019-642607	Pipe fitter	Mentioned by three sources
2019-651101	Moulder	Mentioned by 13 sources
2019-651202	Welder	Mentioned by four sources and in SETA PIVOTAL lists
2019-651302	Boiler maker	In SETA PIVOTAL lists

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-651501	Rigger	Mentioned by three sources and in SETA PIVOTAL lists
2019-652302	Fitter and turner	In SETA PIVOTAL lists
2019-653101	Automotive motor mechanic	In SETA PIVOTAL lists
2019-653301	Industrial machinery mechanic	Mentioned by three sources
2019-653303	Mechanical fitter	Mentioned by four sources and in SETA PIVOTAL lists
2019-653306	Diesel mechanic	In SETA PIVOTAL lists
2019-662202	Small offset lithography operator	In SETA PIVOTAL lists
2019-671101	Electrician	Mentioned by nine sources and in SETA PIVOTAL lists
2019-671102	Electrical installation inspector	Mentioned by four sources
2019-671202	Millwright	Mentioned by four sources and in SETA PIVOTAL lists
2019-671206	Electrical equipment mechanic	Mentioned by three sources
2019-671301	Electrical line mechanic	Mentioned by four sources
2019-672104	Electronic equipment mechanic	Mentioned by three sources
2019-681103	Butcher	In SETA PIVOTAL lists
2019-681201	Confectionary baker	In SETA PIVOTAL lists
2019-682303	Wood machinist	In SETA PIVOTAL lists
2019-683201	Clothing, home textiles, and general goods cutter	In SETA PIVOTAL lists
2019-684305	Quality controller (manufacturing)	In SETA PIVOTAL lists
2019-684901	Textile, clothing, footwear, and leather processing machine mechanic	In SETA PIVOTAL lists
2019-711101	Mining operator	Mentioned by three sources
2019-718201	Boiler or engine operator	In SETA PIVOTAL lists
2019-718304	Packaging manufacturing machine minder	In SETA PIVOTAL lists
2019-721901	Product assembler	In SETA PIVOTAL lists
2019-732204	Oversize load pilot/escort	In SETA PIVOTAL lists
2019-733103	Passenger coach driver	In SETA PIVOTAL lists
2019-733201	Truck driver (general)	In SETA PIVOTAL lists
2019-734101	Agricultural mobile plant (equipment) operator	Mentioned by five sources and in SETA PIVOTAL lists
2019-811201	Commercial cleaner	In SETA PIVOTAL lists

6-DIGIT OFO CODES	6-DIGIT DESCRIPTION	REASON FOR INCLUSION
2019-821101	Crop production farm worker/assistant	In SETA PIVOTAL lists
2019-821301	Mixed crop and livestock farm worker/assistant	In SETA PIVOTAL lists
2019-831301	Builder's worker	In SETA PIVOTAL lists
2019-833301	Freight handler (rail or road)	In SETA PIVOTAL lists
2019-862916	Farm maintenance worker	In SETA PIVOTAL lists
2019-862918	Electrical or telecommunications trades assistant	Mentioned by three sources

Again, these occupations are predominantly representative of major categories 1 and 2, with strong representation across categories 3 and 6 as well. The distribution of occupations seen to be in strategic priority across major groups in the OFO is summarised in Figure 8:

FIGURE 8: Occupations passing dimension 2 criteria by OFO major category



Source: Own analysis of data from sources outlined in Table 2 above

As previously alluded to, some literature sources found in Table 5: List of strategic priority documents reviewed discuss various occupations that are critical to the development of the national economy. However, in some cases, these documents speak more about skills than particular occupations. Therefore, the list of occupations passing D2 might be relatively broad, given the need to match skills to occupations (considering that there is not a 1:1 match between the two concepts).

5.3 Step 3: Overlap between dimensions 1 and 2

The methodology states that occupations passing either D1 or D2 are included in the CSL draft list. Table 12 provides a summary of occupations that meet the criteria to pass either D1 or D2.

TABLE 12: Occupations that passed dimension 1 and/or dimension 2

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-111202	General manager public service		X
2019-111204	Senior government official		X
2019-111207	Senior government manager		X
2019-112101	Director (enterprise/organisation)		X
2019-121101	Finance manager		X
2019-121103	Credit manager		X
2019-121104	Internal audit manager		X
2019-121201	Human resource manager		X
2019-121202	Business training manager		X
2019-121204	Recruitment manager		X
2019-121205	Employee wellness manager		X
2019-121206	Health and safety manager		X
2019-121207	Personnel manager		X
2019-121301	Policy and planning manager		X
2019-121901	Corporate general manager		X
2019-121905	Programme or project manager		X
2019-122101	Sales and marketing manager		X
2019-122102	Sales manager		X
2019-122301	Research and development manager	X	
2019-131101	Agricultural farm manager		X
2019-131201	Aquaculture farm manager		X
2019-132101	Manufacturer		X
2019-132102	Manufacturing operations manager		X
2019-132104	Engineering manager		X
2019-132201	Mining operations manager		X
2019-132301	Construction project manager		X
2019-132401	Supply and distribution manager		X
2019-132402	Logistics manager		X

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-132403	Road transport manager		X
2019-132404	Warehouse manager		X
2019-132407	Airport or harbour manager		X
2019-133101	Chief information officer		X
2019-133102	ICT project manager		X
2019-133103	Data management manager		X
2019-133104	Application development manager		X
2019-133105	Information technology manager		X
2019-133106	Information systems director		X
2019-134501	School principal	X	X
2019-134502	FET college principal	X	
2019-134503	Faculty head	X	
2019-134504	District education manager	X	
2019-134505	Educational rector	X	
2019-134506	Educational registrar	X	
2019-134507	Departmental head	X	X
2019-134901	Environmental manager		X
2019-134903	Small business manager		X
2019-141201	Café (licensed) or restaurant manager	X	X
2019-141202	Licensed club manager	X	
2019-141203	Catering production manager	X	
2019-141204	Reservations manager	X	
2019-142101	Importer or exporter	X	
2019-142102	Wholesaler	X	
2019-142103	Retail general manager	X	X
2019-142104	Post office manager	X	
2019-143105	Sports administrator		X
2019-143901	Facilities manager	X	
2019-143902	Cleaning services manager	X	
2019-143903	Boarding kennel or cattery manager	X	
2019-143904	Security services manager	X	X
2019-143905	Call or contact centre manager	X	
2019-143906	Caravan park and camping ground manager	X	
2019-143907	Dockmaster	X	

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-143908	Travel accommodation inspector	X	
2019-143909	Travel agency manager	X	
2019-211301	Chemist		X
2019-211401	Geologist		X
2019-211402	Geophysicist		X
2019-211403	Materials scientist		X
2019-211405	Mineralogist		X
2019-211406	Hydrologist		X
2019-211407	Oceanographer		X
2019-212101	Actuary		X
2019-213109	Zoologist		X
2019-213201	Agriculture consultant		X
2019-213202	Agricultural scientist		X
2019-213204	Wine maker		X
2019-213205	Food and beverage scientist		X
2019-213302	Environmental scientist		X
2019-213306	Water quality analyst		X
2019-213307	Park ranger		X
2019-214101	Industrial engineer		X
2019-214102	Industrial engineering technologist		X
2019-214201	Civil engineer		X
2019-214202	Civil engineering technologist		X
2019-214301	Environmental engineer		X
2019-214302	Environmental impact and restoration analyst		X
2019-214401	Mechanical engineer		X
2019-214402	Mechanical engineering technologist		X
2019-214403	Aeronautical engineer		X
2019-214404	Aeronautical engineering technologist		X
2019-214405	Naval architect		X
2019-214501	Chemical engineer		X
2019-214502	Chemical engineering technologist		X
2019-214601	Mining engineer		X
2019-214904	Quantity surveyor		X
2019-214905	Agricultural engineer		X

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-214906	Agricultural engineering technologist		X
2019-215101	Electrical engineer		X
2019-215102	Electrical engineering technologist		X
2019-215103	Energy engineer		X
2019-215104	Energy engineering technologist		X
2019-216101	Architect	X	X
2019-216201	Landscape architect		X
2019-216401	Urban and regional planner		X
2019-216502	Surveyor		X
2019-216601	Digital artist	X	
2019-216602	Illustrator	X	
2019-216603	Multimedia designer	X	X
2019-216604	Web designer	X	
2019-221101	General medical practitioner		X
2019-221203	Emergency medicine specialist		X
2019-221210	General medicine specialist physician		X
2019-221214	Nuclear medicine specialist		X
2019-221218	Medical geneticist		X
2019-221221	Public health medicine specialist		X
2019-221222	Public health occupational medicine specialist		X
2019-222103	Registered nurse (child and family health)		X
2019-222104	Registered nurse (community health)		X
2019-222108	Registered nurse (medical)		X
2019-222109	Registered nurse (medical practice)		X
2019-222110	Registered nurse (mental health)		X
2019-222114	Nurse educator		X
2019-225101	Veterinarian		X
2019-226201	Hospital pharmacist		X
2019-226202	Industrial pharmacist		X
2019-226203	Retail pharmacist		X
2019-226302	SHE&Q practitioner		X
2019-226401	Physiotherapist		X
2019-226905	Biokineticist		X
2019-231101	University lecturer		X

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-232130	TVET educator		X
2019-233107	FET phase school teacher (Grades 10–12)		X
2019-233108	Senior phase school teacher (Grades 7–9)		X
2019-234101	Foundation phase school teacher		X
2019-234102	Intermediate phase school teacher (Grades 4–6)		X
2019-234201	Early childhood development practitioner		X
2019-235101	Education or training advisor		X
2019-235201	Special needs teacher		X
2019-235502	Private tuition dance teacher		X
2019-241101	General accountant	X	X
2019-241102	Management accountant	X	X
2019-241103	Tax professional	X	X
2019-241104	External auditor	X	X
2019-241106	Accountant in practice	X	X
2019-241107	Financial accountant	X	X
2019-241108	Forensic accountant	X	X
2019-241201	Investment analyst		X
2019-241202	Investment manager		X
2019-241203	Investment advisor		X
2019-241301	Financial investment advisor		X
2019-242101	Management consultant	X	X
2019-242102	Organisation and methods analyst	X	
2019-242103	Business development officer	X	X
2019-242104	AML surveillance analyst	X	X
2019-242201	Intelligence officer	X	
2019-242202	Policy analyst	X	X
2019-242203	Company secretary	X	
2019-242204	Corporate treasurer	X	
2019-242207	Compliance officer	X	X
2019-242208	Organisational risk manager	X	X
2019-242209	Accounting officer	X	
2019-242210	Business administrator	X	
2019-242211	Internal auditor	X	X
2019-242212	Diplomat	X	

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-242213	Regulatory affairs officer	X	
2019-242214	Intellectual property special advisor	X	
2019-242215	Fraud examiner	X	
2019-242303	Human resource advisor		X
2019-242304	Industrial relations advisor		X
2019-243101	Advertising specialist	X	X
2019-243102	Market research analyst	X	X
2019-243103	Marketing practitioner	X	X
2019-243104	Market campaign analyst	X	
2019-243201	Communication coordinator	X	
2019-243202	Communication strategist	X	
2019-243203	Corporate communication manager	X	
2019-243204	Event producer	X	
2019-243301	Industrial products sales representative	X	
2019-243302	Medical and pharmaceutical products sales representative	X	
2019-243303	Educational products and services sales representative	X	
2019-243304	Printing and publishing equipment sales representative	X	
2019-243401	ICT account manager		X
2019-243402	ICT business development manager		X
2019-243403	ICT sales representative		X
2019-251101	ICT systems analyst	X	X
2019-251102	Data scientist	X	X
2019-251201	Software developer	X	X
2019-251202	Programmer analyst	X	X
2019-251203	Developer programmer	X	X
2019-251301	Multimedia specialist	X	X
2019-251302	Web developer	X	X
2019-251401	Applications programmer		X
2019-251901	Computers quality assurance analyst	X	X
2019-252101	Database designer and administrator	X	X
2019-252201	Systems administrator		X
2019-252301	Computer network and systems engineer		X

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-252302	Network analyst		X
2019-252901	ICT security specialist		X
2019-262202	Information services manager		X
2019-263101	Economist		X
2019-263206	Heritage consultant		X
2019-263403	Organisational psychologist		X
2019-263501	Social counselling worker		X
2019-264202	Editor		X
2019-311101	Chemistry technician		X
2019-311201	Civil engineering technician		X
2019-311217	Water control officer		X
2019-311301	Electrical engineering technician		X
2019-311302	Electric substation operations manager		X
2019-311501	Mechanical engineering technician		X
2019-311502	Pressure equipment inspector		X
2019-311503	Aeronautical engineering technician		X
2019-311601	Chemical engineering technician		X
2019-311801	Draughtsperson		X
2019-311903	Food and beverage technician		X
2019-311905	Industrial engineering technician		X
2019-312101	Mining production supervisor		X
2019-312103	Engineering supervisor		X
2019-312201	Production/operations supervisor (manufacturing)		X
2019-312301	Building associate		X
2019-313201	Water plant operator		X
2019-313907	Food and beverage manufacturing process controller		X
2019-314102	Environmental science technician		X
2019-314201	Agricultural technician		X
2019-321101	Medical diagnostic radiographer		X
2019-321201	Medical technician		X
2019-325703	Agricultural/horticultural produce inspector		X
2019-325802	Intensive care ambulance paramedic/ambulance paramedic		X

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-331201	Credit or loans officer	X	
2019-331204	False worker	X	
2019-331205	Business banker	X	
2019-331301	Bookkeeper	X	
2019-331302	Accounting technician	X	
2019-331303	Tax technician	X	
2019-331401	Statistical and mathematical assistant	X	
2019-332101	Insurance agent	X	X
2019-332102	Insurance broker	X	
2019-332201	Commercial sales representative	X	X
2019-332202	Sales representative (building and plumbing supplies)	X	
2019-332203	Sales representative (personal and household goods)	X	X
2019-332204	Commercial services sales agent	X	
2019-332205	Manufacturers representative	X	
2019-332206	Sales representative (photographic equipment and supplies)	X	
2019-332207	Chemical sales representative	X	
2019-332208	Pharmacy sales assistant	X	
2019-332301	Retail buyer		X
2019-332302	Purchasing officer		X
2019-333402	Real estate agent		X
2019-333905	Supply chain practitioner		X
2019-334301	Secretary bargaining council	X	
2019-334302	Personal assistant	X	
2019-335916	Gaming operations compliance officer		X
2019-343401	Chef	X	X
2019-343902	Light technician		X
2019-351101	Computer operator		X
2019-351201	ICT communications assistant		X
2019-351301	Computer network technician	X	X
2019-351302	Geographic information systems technicians	X	X
2019-351303	Marine GIS technician	X	
2019-411101	General clerk		X

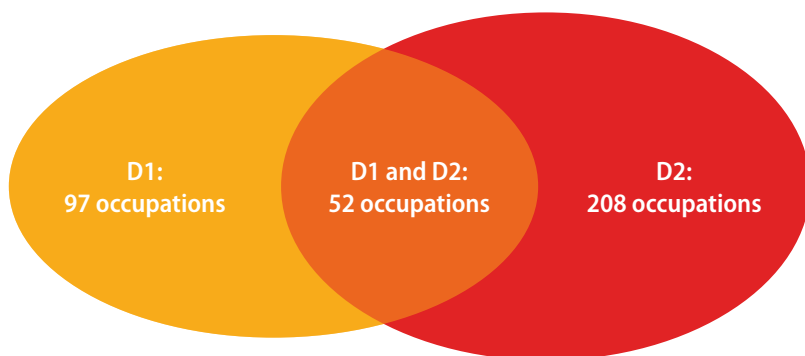
2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-413201	Data entry operator	X	
2019-421102	Bank worker		X
2019-422101	Tourist information officer	X	
2019-422102	Travel consultant	X	
2019-422201	Inbound contact centre consultant	X	
2019-422202	Outbound contact centre consultant	X	
2019-422203	Contact centre real time advisor	X	
2019-422204	Contact centre resource planner	X	
2019-422205	Contact centre forecast analyst	X	
2019-422206	Call or contact centre agent	X	X
2019-422501	Enquiry clerk	X	
2019-431101	Accounts clerk	X	
2019-431102	Cost clerk	X	
2019-431103	Taxation clerk	X	
2019-432301	Transport clerk	X	
2019-441601	Human resources clerk		X
2019-441903	Programme or project administrators		X
2019-516301	Funeral director		X
2019-522201	Retail supervisor	X	X
2019-522301	Sales assistant (general)	X	X
2019-522302	Motorised vehicle or caravan salesperson	X	
2019-522303	Automotive parts salesperson	X	
2019-522304	ICT sales assistant	X	
2019-524201	Sales demonstrator	X	
2019-524401	Call centre salesperson	X	
2019-541401	Security officer		X
2019-541402	Alarm, security, or surveillance monitor		X
2019-611202	Horticultural farmer		X
2019-641201	Bricklayer		X
2019-641402	Fibre-cement moulder		X
2019-641403	Civil engineering constructor		X
2019-641501	Carpenter and joiner		X
2019-641502	Carpenter		X
2019-641503	Joiner		X

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-641902	Scaffolder		X
2019-642301	Fibrous plasterer		X
2019-642302	Plasterer		X
2019-642601	Plumber		X
2019-642605	Plumbing inspector		X
2019-642607	Pipe fitter		X
2019-651101	Moulder		X
2019-651202	Welder		X
2019-651302	Boiler maker		X
2019-651501	Rigger		X
2019-652301	Metal machinist	X	
2019-652302	Fitter and turner	X	X
2019-653101	Automotive motor mechanic		X
2019-653301	Industrial machinery mechanic	X	X
2019-653302	Mechanical equipment repairer	X	
2019-653303	Mechanical fitter	X	X
2019-653304	Diesel fitter	X	
2019-653305	Small engine mechanic	X	
2019-653306	Diesel mechanic	X	X
2019-653307	Heavy equipment mechanic	X	
2019-653308	Tractor mechanic	X	
2019-653309	Forklift mechanic	X	
2019-653310	Lubrication equipment mechanic	X	
2019-662202	Small offset lithography operator		X
2019-671101	Electrician	X	X
2019-671102	Electrical installation inspector	X	X
2019-671202	Millwright	X	X
2019-671203	Mechatronics technician	X	
2019-671204	Lift mechanic	X	
2019-671205	Weapon systems mechanic	X	
2019-671206	Electrical equipment mechanic	X	X
2019-671207	Armature winder	X	
2019-671208	Transportation electrician	X	
2019-671301	Electrical line mechanic		X

2019 OFO CODE	2019 OFO DESCRIPTION	DIMENSION 1: ACUTE SHORTAGE	DIMENSION 2: STRATEGIC PRIORITY
2019-672104	Electronic equipment mechanician		X
2019-681103	Butcher		X
2019-681201	Confectionary baker		X
2019-682303	Wood machinist		X
2019-683201	Clothing, home textiles, and general goods cutter		X
2019-684301	Crop produce analyst	X	
2019-684302	Tobacco grader	X	
2019-684303	Cotton grader	X	
2019-684304	Wool classer/grader	X	
2019-684305	Quality controller (manufacturing)	X	X
2019-684901	Textile, clothing, footwear, and leather processing machine mechanic		X
2019-711101	Mining operator		X
2019-718201	Boiler or engine operator		X
2019-718304	Packaging manufacturing machine minder		X
2019-721901	Product assembler		X
2019-732204	Oversize load pilot/escort		X
2019-733103	Passenger coach driver		X
2019-733201	Truck driver (general)		X
2019-734101	Agricultural mobile plant (equipment) operator		X
2019-811201	Commercial cleaner	X	X
2019-811202	Healthcare cleaner	X	
2019-811203	Tea attendant	X	
2019-811204	Caretaker/cleaner	X	
2019-821101	Crop production farm worker/assistant		X
2019-821301	Mixed crop and livestock farm worker/assistant		X
2019-831301	Builder's worker		X
2019-833301	Freight handler (rail or road)		X
2019-862916	Farm maintenance worker		X
2019-862918	Electrical or telecommunications trades assistant		X

It is interesting to note that some occupations are both in acute shortage and have been earmarked as being in strategic priority. The overlap between these two dimensions is summarised in Figure 9:

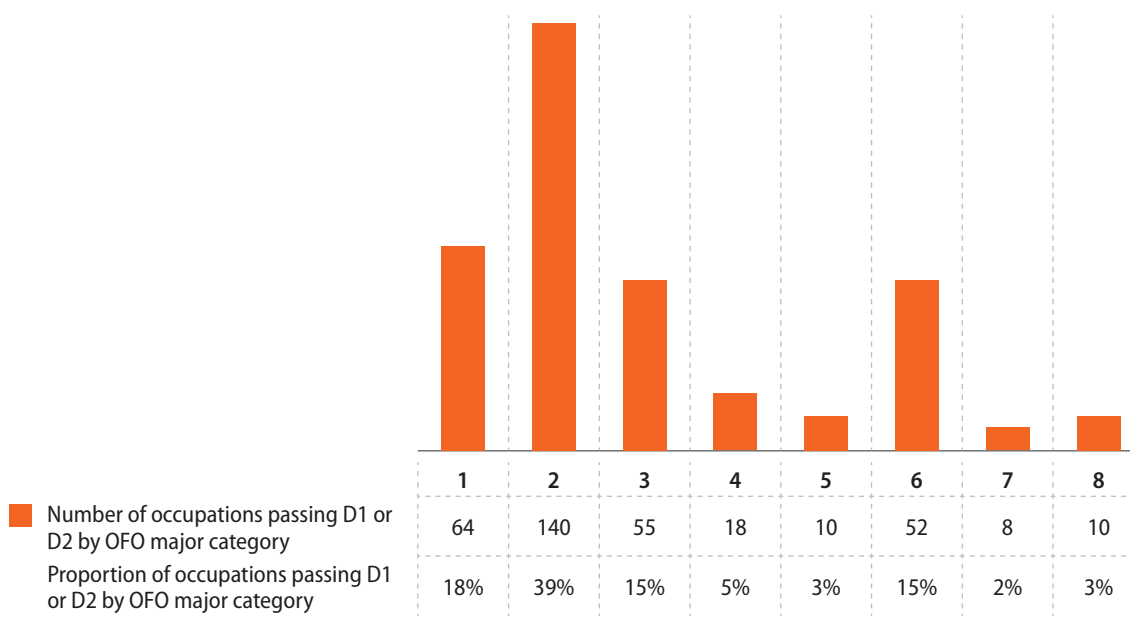
FIGURE 9: Overlap between occupations that passed dimension 1 and/or dimension 2



Of the list of 357 occupations that passed either D1 or D2, only 52 of them passed both dimensions. Therefore, 52 occupations are both in acute shortage across the country and of strategic priority to the government.

Also, the list of 357 occupations is quite broadly representative of every major category across the OFO. The distribution of occupations is shown in Figure 10:

FIGURE 10: Distribution of occupations passing dimension 1 or dimension 2



Source: Own analysis of own data gathered from Statistics South Africa, and literature sources outlined in Table 5: List of strategic priority documents reviewed

Although occupations in major categories 1, 2, 3, and 6 are represented the most, there is still some representation of occupations in other major categories.

Of course, these occupations exhibit signals of shortage and/or are earmarked as being a government priority. However, some of these occupations do not require post-school training above an NQF Level 5. Those occupations that do not require extensive technical or professional competence or a long lead-time to develop are excluded from the following section.

5.4 Steps 4 and 5: Analysis of dimensions 3 and 4: Occupations requiring technical or professional competence and a long lead-time to develop

The occupations that passed either D1 or D2 have either shown some sign of shortage or government investment priority. However, some of those occupations can either be trained for in a relatively short time or do not require sufficient competence levels to be opened up to foreign nationals for migration preference. Through filtering based on the skill level needed for each occupation and the years it would take to cultivate that skill domestically, a shortlist of occupations can be created. This shortlist is presented in Table 13:

TABLE 13: Shortlist of occupations passing dimensions 1 or 2, and subsequently passing dimensions 3 and 4

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-111202	General manager public service	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-111204	Senior government official	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-111207	Senior government manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-112101	Director (enterprise/organisation)	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-121101	Finance manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-121103	Credit manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-121104	Internal audit manager	Bachelor's degree or advanced diploma (NQF Level 7)	>2 years
2019-121201	Human resource manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-121202	Business training manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-121204	Recruitment manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-121205	Employee wellness manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-121206	Health and safety manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-121207	Personnel manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-121301	Policy and planning manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-121901	Corporate general manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-122101	Sales and marketing manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-122102	Sales manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-122301	Research and development manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-131101	Agricultural farm manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-131201	Aquaculture farm manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-132101	Manufacturer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-132102	Manufacturing operations manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-132104	Engineering manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-132201	Mining operations manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-132301	Construction project manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-132401	Supply and distribution manager	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-132402	Logistics manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-133101	Chief information officer	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-133102	ICT project manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-133103	Data management manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-133104	Application development manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-133105	Information technology manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-133106	Information systems director	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-134503	Faculty head	Doctoral degree (NQF Level 10)	7–10 years
2019-134504	District education manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-134505	Educational rector	Doctoral degree (NQF Level 10)	7–10 years
2019-134506	Educational registrar	Doctoral degree (NQF Level 10)	7–10 years
2019-134507	Departmental head	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-134901	Environmental manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-134903	Small business manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-141201	Café (licensed) or restaurant manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-141202	Licensed club manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-141203	Catering production manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-141204	Reservations manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-142101	Importer or exporter	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-142102	Wholesaler	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-142103	Retail general manager	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-142104	Post Office manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-143105	Sports administrator	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-143901	Facilities manager	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-143902	Cleaning services manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-143903	Boarding kennel or cattery manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-143904	Security services manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-143905	Call or contact centre manager	Diploma or advanced certificate (NQF Level 6)	2–3 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-143906	Caravan park and camping ground manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-143908	Travel accommodation inspector	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-211301	Chemist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-211401	Geologist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-211402	Geophysicist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-211403	Materials scientist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-211405	Mineralogist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-211406	Hydrologist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-211407	Oceanographer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-212101	Actuary	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-213109	Zoologist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-213201	Agriculture consultant	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-213202	Agricultural scientist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-213204	Wine maker	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-213205	Food and beverage scientist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-213302	Environmental scientist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-213306	Water quality analyst	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-213307	Park ranger	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-214101	Industrial engineer	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-214102	Industrial engineering technologist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-214301	Environmental engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-214302	Environmental impact and restoration analyst	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-214401	Mechanical engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-214402	Mechanical engineering technologist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-214403	Aeronautical engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-214404	Aeronautical engineering technologist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-214405	Naval architect	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-214501	Chemical engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-214601	Mining engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-214904	Quantity surveyor	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-214905	Agricultural engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-214906	Agricultural engineering technologist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-215101	Electrical engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-215102	Electrical engineering technologist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-215103	Energy engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-215104	Energy engineering technologist	Diploma or advanced certificate (NQF Level 6)	2–3 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-216101	Architect	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-216201	Landscape architect	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-216401	Urban and regional planner	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-216601	Digital artist	Bachelor Honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-216603	Multimedia designer	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-216604	Web designer	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-221101	General medical practitioner	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-221203	Emergency medicine specialist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-221210	General medicine specialist physician	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-221214	Nuclear medicine specialist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-221218	Medical geneticist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-221221	Public health medicine specialist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-222103	Registered nurse (child and family health)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-222104	Registered nurse (community health)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-222108	Registered nurse (medical)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-222109	Registered nurse (medical practice)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-222110	Registered nurse (mental health)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-222114	Nurse educator	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-225101	Veterinarian	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-226201	Hospital pharmacist	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-226202	Industrial pharmacist	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-226203	Retail pharmacist	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-226401	Physiotherapist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-231101	University lecturer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-233107	FET phase school teacher (Grades 10–12)	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-233108	Senior phase school teacher (Grades 7–9)	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-234101	Foundation phase school teacher	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-234102	Intermediate phase school teacher (Grades 4–6)	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-235101	Education or training advisor	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-235201	Special needs teacher	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-241101	General accountant	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-241102	Management accountant	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-241103	Tax professional	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-241104	External auditor	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-241106	Accountant in practice	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-241107	Financial accountant	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-241108	Forensic accountant	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-241201	Investment analyst	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-241202	Investment manager	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-241203	Investment advisor	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-241301	Financial investment advisor	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-242101	Management consultant	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-242102	Organisation and methods analyst	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-242103	Business development officer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-242104	AML surveillance analyst	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-242201	Intelligence officer	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-242202	Policy analyst	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-242203	Company secretary	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	>2 years
2019-242204	Corporate treasurer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-242207	Compliance officer	Diploma or advanced certificate (NQF Level 6)	>2 years
2019-242208	Organisational risk manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-242209	Accounting officer	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-242210	Business administrator	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-242211	Internal auditor	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-242212	Diplomat	Bachelor's degree or advanced diploma (NQF Level 7)	>2 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-242213	Regulatory affairs officer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-242214	Intellectual property special advisor	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-242215	Fraud examiner	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-242303	Human resource advisor	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-243101	Advertising specialist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-243102	Market research analyst	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-243103	Marketing practitioner	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-243104	Market campaign analyst	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-243202	Communication strategist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-243203	Corporate communication manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-243401	ICT account manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-243402	ICT business development manager	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-251102	Data scientist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-251201	Software developer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-251202	Programmer analyst	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-251203	Developer programmer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-251301	Multimedia specialist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-251302	Web developer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-251401	Applications programmer	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-251901	Computers quality assurance analyst	Diploma or advanced certificate (NQF Level 6)	2–3 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-252101	Database designer and administrator	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-252201	Systems administrator	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-252301	Computer network and systems engineer	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-252302	Network analyst	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-252901	ICT security specialist	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-262202	Information services manager	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-263101	Economist	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-263206	Heritage consultant	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-263403	Organisational psychologist	Master's degree (NQF Level 9)	5–6 years
2019-263501	Social counselling worker	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-311101	Chemistry technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-311201	Civil engineering technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-311301	Electrical engineering technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-311302	Electric substation operations manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-311501	Mechanical engineering technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-311503	Aeronautical Engineering Technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-311601	Chemical engineering technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-311903	Food and beverage technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-311905	Industrial engineering technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-312103	Engineering supervisor	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years

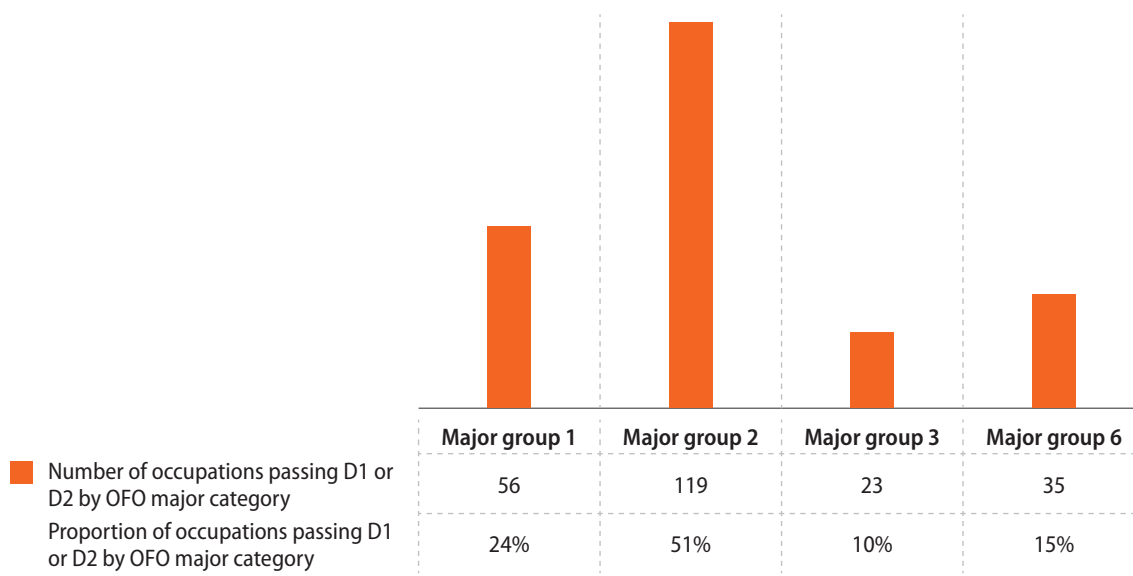
6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-312201	Production/ operations supervisor (manufacturing)	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-313907	Food and beverage manufacturing process controller	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-314102	Environmental science technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-321101	Medical diagnostic radiographer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-325703	Agricultural/horticultural produce inspector	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-325802	Intensive care ambulance paramedic/ ambulance paramedic	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-331205	Business banker	Bachelor's degree or advanced diploma (NQF Level 7)	3–4 years
2019-331401	Statistical and mathematical assistant	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	4 years
2019-343401	Chef	Diploma or Advanced Certificate (NQF Level 6)	2–3 years
2019-351101	Computer operator	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-351201	ICT communications assistant	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-351301	Computer network technician	Diploma or advanced certificate (NQF Level 6)	2–3 years
2019-351303	Marine GIS technician	Higher certificate (NQF Level 5)	2–3 years
2019-641201	Bricklayer	National certificate (NQF Level 4)	1–2 years
2019-641501	Carpenter and joiner	National certificate (NQF Level 4)	1–2 years
2019-641502	Carpenter	National certificate (NQF Level 4)	1–2 years
2019-641503	Joiner	National certificate (NQF Level 4)	1–2 years
2019-642302	Plasterer	National certificate (NQF Level 4)	1–2 years
2019-642601	Plumber	National certificate (NQF Level 4)	1–2 years
2019-642607	Pipe fitter	National certificate (NQF Level 4)	1–2 years
2019-651101	Moulder	National certificate (NQF Level 4)	1–2 years
2019-651202	Welder	National certificate (NQF Level 4)	1–2 years
2019-651302	Boiler maker	National certificate (NQF Level 4)	1–2 years

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM REQUIRED QUALIFICATION	APPROXIMATE LEAD-TIME FOR DEVELOPMENT
2019-651501	Rigger	National certificate (NQF Level 4)	1–2 years
2019-652301	Metal machinist	National certificate (NQF Level 4)	1–2 years
2019-652302	Fitter and turner	National certificate (NQF Level 4)	1–2 years
2019-653101	Automotive motor mechanic	National certificate (NQF Level 4)	1–2 years
2019-653301	Industrial machinery mechanic	National certificate (NQF Level 4)	1–2 years
2019-653303	Mechanical fitter	National certificate (NQF Level 4)	1–2 years
2019-653304	Diesel fitter	National certificate (NQF Level 4)	1–2 years
2019-653305	Small engine mechanic	National certificate (NQF Level 4)	1–2 years
2019-653306	Diesel mechanic	National certificate (NQF Level 4)	1–2 years
2019-653307	Heavy equipment mechanic	National certificate (NQF Level 4)	1–2 years
2019-653308	Tractor mechanic	National certificate (NQF Level 4)	1–2 years
2019-653309	Forklift mechanic	National certificate (NQF Level 4)	1–2 years
2019-671101	Electrician	National certificate (NQF Level 4)	1–2 years
2019-671202	Millwright	National certificate (NQF Level 4)	1–2 years
2019-671203	Mechatronics technician	National certificate (NQF Level 4)	1–2 years
2019-671204	Lift mechanic	National certificate (NQF Level 4)	1–2 years
2019-671205	Weapon systems mechanic	National certificate (NQF Level 4)	1–2 years
2019-671206	Electrical equipment mechanic	National certificate (NQF Level 4)	1–2 years
2019-671207	Armature winder	National certificate (NQF Level 4)	1–2 years
2019-671208	Transportation electrician	National certificate (NQF Level 4)	1–2 years
2019-671301	Electrical line mechanic	National certificate (NQF Level 4)	1–2 years
2019-672104	Electronic equipment mechanic	National certificate (NQF Level 4)	1–2 years
2019-681103	Butcher	National certificate (NQF Level 4)	3 years
2019-682303	Wood machinist	Intermediate certificate (NQF Level 3)	2 years
2019-684901	Textile, clothing, footwear, and leather processing machine mechanic	National certificate (NQF Level 4)	3 years

These occupations act as a draft CSL prior to validation (which is subject to discussion in the following section).

However, before this validation, the shortlist for the CSL is distributed by major group accordingly:

FIGURE 11: Major group category distribution of occupations passing D1/D2 and D3 and D4



Given that, by definition, the CSL needs to reflect occupations with high levels of technical or professional skill, it is methodologically sound that occupations highlighted in major groups 1, 2, 3, and 6 are represented. The occupations in other major groups have dropped off from the shortlist given that these occupations:

1. Do not require qualifications at NQF Level 5 or above (unless the occupation is artisanal); and
2. Do not take more than two years to cultivate domestically (unless the occupation is artisanal).

The shortlist, however, includes occupations for which skills bases might be sufficient in the domestic labour market already. In order to finalise the CSL to exclude occupations for which there is a sufficient supply of unemployed South Africans, among other things, validation of the list found in Table 13 was necessary. This validation is described next.

5.5 Step 6: Moving from draft to final CSL

As described in section 4.4.2, the draft list is finalised by following six validation processes. The first four are carried out using a desktop review, while the final two rely on stakeholder engagements. This section first discusses the approach to the desktop validation processes and its results. It then discusses the findings from the stakeholder engagements. The stakeholder engagements carry a lot of weight and, therefore, if an occupation has been excluded from the draft list through the formal methodology or the desktop-based validation process, it can be re-included based on stakeholder inputs.

5.5.1 Desktop validation

For each of the desktop-based validation channels, a specific criterion has been applied to decide whether an occupation should remain on the list. The application of the criteria works as follows:

- If an occupation is not pertinent to a high-priority sector, it is excluded;
- If an occupation is pertinent to a high-priority sector but fulfils at least one of the exclusion criteria of any one of the other two channels, it is also excluded.

TABLE 14: Exclusion criteria for each desktop-based validation channel

CHANNEL	EXCLUSION CRITERIA
High-priority Sector	<p>Occupation not pertinent to a high-priority sector. The high priority sectors are as follows:</p> <ul style="list-style-type: none"> ● Business process services (outsourcing economy) ● Education economy ● Tourism and creative economy ● Agriculture economy ● Mining economy ● Construction economy ● Health economy ● Education economy ● Electro-technical economy ● Defence/aerospace/oceans economy ● Industrial economy
Sensibility filter	<p>Occupation that falls within the following categories:</p> <ul style="list-style-type: none"> ● Government management positions ● Special talent occupations ● Non-developmental-related occupations ● Occupations that passed through the initial round of filtering that are mandated by legislation or executive order to exclusively employ South African nationals ● Occupations that are general enough to draw from individuals who have obtained multiple qualifications or various expertise; these occupations can, therefore, require broad and varying skills and qualifications, depending on the context in which they are required
Index score cut-off	<p>Occupation index score equal to or lower than 0.0371 (follows an 86% drop in index score from precedingly ranked occupation)</p>

These exclusion criteria reduce the draft list found in Table 15 (containing 279 occupations) to a list of 114 occupations.

TABLE 15: Desktop validation results (occupations highlighted in green pass the desktop validation process)

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-111202	General manager public service	X	X	X
2019-111204	Senior government official	X	X	X
2019-111207	Senior government manager	X	X	X
2019-112101	Director (enterprise/organisation)		X	X
2019-121101	Finance manager		X	
2019-121103	Credit manager		X	
2019-121104	Internal audit manager		X	
2019-121201	Human resource manager		X	X
2019-121202	Business training manager		X	X
2019-121204	Recruitment manager		X	X
2019-121205	Employee wellness manager		X	X
2019-121206	Health and safety manager		X	X
2019-121207	Personnel manager		X	X
2019-121301	Policy and planning manager			
2019-121901	Corporate general manager		X	
2019-121905	Programme or project manager		X	
2019-122101	Sales and marketing manager	X	X	
2019-122102	Sales manager	X	X	
2019-122301	Research and development manager			
2019-131101	Agricultural farm manager			
2019-131201	Aquaculture farm manager			X
2019-132101	Manufacturer			
2019-132102	Manufacturing operations manager			
2019-132104	Engineering manager			
2019-132201	Mining operations manager			X
2019-132301	Construction project manager			
2019-132401	Supply and distribution manager	X		
2019-132402	Logistics manager	X	X	
2019-132403	Road transport manager	X	X	
2019-132404	Warehouse manager	X	X	
2019-132407	Airport or harbour manager	X		
2019-133101	Chief information officer			

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-133102	ICT project manager			
2019-133103	Data management manager			
2019-133104	Application development manager			
2019-133105	Information technology manager			
2019-133106	Information systems director			
2019-134501	School principal		X	
2019-134502	FET college principal			
2019-134503	Faculty head		X	
2019-134504	District education manager		X	
2019-134505	Educational rector		X	
2019-134506	Educational registrar		X	
2019-134507	Departmental head		X	
2019-134901	Environmental manager		X	X
2019-134903	Small business manager			X
2019-141201	Café (licensed) or restaurant manager		X	
2019-141202	Licensed club manager		X	
2019-141203	Catering production manager		X	
2019-141204	Reservations manager		X	
2019-142101	Importer or exporter	X	X	
2019-142102	Wholesaler	X	X	
2019-142103	Retail general manager	X	X	
2019-142104	Post office manager	X	X	
2019-143105	Sports administrator	X	X	
2019-143901	Facilities manager	X		
2019-143902	Cleaning services manager	X		
2019-143903	Boarding kennel or cattery manager	X		
2019-143904	Security services manager	X	X	
2019-143905	Call or contact centre manager			
2019-143906	Caravan park and camping ground manager		X	
2019-143907	Dockmaster	X		
2019-143908	Travel accommodation inspector			
2019-143909	Travel agency manager			
2019-211301	Chemist			X

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-211401	Geologist			
2019-211402	Geophysicist			
2019-211403	Materials scientist			
2019-211405	Mineralogist			
2019-211406	Hydrologist			
2019-211407	Oceanographer			
2019-212101	Actuary			X
2019-213109	Zoologist			X
2019-213201	Agriculture consultant			X
2019-213202	Agricultural scientist			X
2019-213204	Wine maker			X
2019-213205	Food and beverage scientist			X
2019-213302	Environmental scientist			X
2019-213306	Water quality analyst			X
2019-213307	Park ranger		X	X
2019-214101	Industrial engineer			
2019-214102	Industrial engineering technologist			
2019-214201	Civil engineer			
2019-214202	Civil engineering technologist			
2019-214301	Environmental engineer			X
2019-214302	Environmental impact and restoration analyst			X
2019-214401	Mechanical engineer			
2019-214402	Mechanical engineering technologist			
2019-214403	Aeronautical engineer			
2019-214404	Aeronautical engineering technologist			
2019-214405	Naval architect			
2019-214501	Chemical engineer			X
2019-214502	Chemical engineering technologist			X
2019-214601	Mining engineer			X
2019-214904	Quantity surveyor			
2019-214905	Agricultural engineer			
2019-214906	Agricultural engineering technologist			

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-215101	Electrical engineer			X
2019-215102	Electrical engineering technologist			X
2019-215103	Energy engineer			X
2019-215104	Energy engineering technologist			X
2019-216101	Architect			
2019-216201	Landscape architect			X
2019-216401	Urban and regional planner			X
2019-216502	Surveyor			X
2019-216601	Digital artist			
2019-216602	Illustrator		X	
2019-216603	Multimedia designer			
2019-216604	Web designer			
2019-221101	General medical practitioner			
2019-221203	Emergency medicine specialist			X
2019-221210	General medicine specialist physician			X
2019-221214	Nuclear medicine specialist			X
2019-221218	Medical geneticist			X
2019-221221	Public health medicine specialist			X
2019-221222	Public health occupational medicine specialist			X
2019-222103	Registered nurse (child and family health)			
2019-222104	Registered nurse (community health)			
2019-222108	Registered nurse (medical)			
2019-222109	Registered nurse (medical practice)			
2019-222110	Registered nurse (mental health)			
2019-222114	Nurse educator			
2019-225101	Veterinarian	X		X
2019-226201	Hospital pharmacist			
2019-226202	Industrial pharmacist			
2019-226203	Retail pharmacist			
2019-226302	Safety, health, environment, and quality (SHE&Q) Practitioner			X
2019-226401	Physiotherapist			X

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-226905	Biokineticist			X
2019-231101	University lecturer		X	X
2019-232130	TVET educator			X
2019-233107	FET phase school teacher (Grades 10–12)		X	X
2019-233108	Senior phase school teacher (Grades 7–9)		X	X
2019-234101	Foundation phase school teacher		X	X
2019-234102	Intermediate phase school teacher (Grades 4–6)		X	X
2019-234201	Early childhood development practitioner		X	X
2019-235101	Education or training advisor			X
2019-235201	Special needs teacher		X	X
2019-235502	Private tuition dance teacher		X	X
2019-241101	General accountant			
2019-241102	Management accountant			
2019-241103	Tax professional			
2019-241104	External auditor			
2019-241106	Accountant in practice			
2019-241107	Financial accountant			
2019-241108	Forensic accountant			
2019-241201	Investment analyst			
2019-241202	Investment manager			
2019-241203	Investment advisor			
2019-241301	Financial investment advisor			
2019-242101	Management consultant			
2019-242102	Organisation and methods analyst			
2019-242103	Business development officer			
2019-242104	AML surveillance analyst		X	
2019-242201	Intelligence officer		X	
2019-242202	Policy analyst			
2019-242203	Company secretary		X	
2019-242204	Corporate treasurer		X	

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-242207	Compliance officer		X	
2019-242208	Organisational risk manager			
2019-242209	Accounting officer		X	
2019-242210	Business administrator		X	
2019-242211	Internal auditor			
2019-242212	Diplomat	X	X	
2019-242213	Regulatory affairs officer		X	
2019-242214	Intellectual property special advisor		X	
2019-242215	Fraud examiner			
2019-242303	Human resource advisor			X
2019-242304	Industrial relations advisor			X
2019-243101	Advertising specialist			
2019-243102	Market research analyst			
2019-243103	Marketing practitioner			
2019-243104	Market campaign analyst			
2019-243201	Communication coordinator			
2019-243202	Communication strategist			
2019-243203	Corporate communication manager			
2019-243204	Event producer		X	
2019-243301	Industrial products sales representative	X	X	
2019-243302	Medical and pharmaceutical products sales representative	X	X	
2019-243303	Educational products and services sales representative	X	X	
2019-243304	Printing and publishing equipment sales representative	X	X	
2019-243401	ICT account manager			X
2019-243402	ICT business development manager			X
2019-243403	ICT sales representative			X
2019-251101	ICT systems analyst			
2019-251102	Data scientist			
2019-251201	Software developer			
2019-251202	Programmer analyst			

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-251203	Developer programmer			
2019-251301	Multimedia specialist			
2019-251302	Web developer			
2019-251401	Applications programmer			X
2019-251901	Computers quality assurance analyst			
2019-252101	Database designer and administrator			
2019-252201	Systems administrator			X
2019-252301	Computer network and systems engineer			X
2019-252302	Network analyst			X
2019-252901	ICT security specialist			X
2019-262202	Information services manager			X
2019-263101	Economist			X
2019-263206	Heritage consultant	X	X	X
2019-263403	Organisational psychologist			X
2019-263501	Social counselling worker			X
2019-264202	Editor		X	X
2019-311101	Chemistry technician			X
2019-311201	Civil engineering technician			X
2019-311301	Electrical engineering technician			X
2019-311302	Electric substation operations manager			X
2019-311501	Mechanical engineering technician			
2019-311502	Pressure equipment inspector			
2019-311503	Aeronautical engineering technician			
2019-311601	Chemical engineering technician			X
2019-311801	Draughtsperson			
2019-311903	Food and beverage technician			X
2019-311905	Industrial engineering technician			X
2019-312103	Engineering supervisor			X
2019-312201	Production/operations supervisor (manufacturing)			
2019-313907	Food and beverage manufacturing process controller			X

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-314102	Environmental science technician			X
2019-321101	Medical diagnostic radiographer			X
2019-325703	Agricultural/horticultural produce inspector			X
2019-325802	Intensive care ambulance paramedic/ ambulance paramedic			X
2019-331201	Credit or loans officer		X	
2019-331204	False worker		X	
2019-331205	Business banker		X	
2019-331303	Tax technician		X	
2019-331401	Statistical and mathematical assistant			
2019-332102	Insurance broker		X	
2019-332301	Retail buyer	X	X	
2019-332302	Purchasing officer	X	X	
2019-333401	Property manager		X	
2019-333404	Real estate sales settlement administrator		X	
2019-333405	Real estate agency principal		X	
2019-333406	Property lease administrator		X	
2019-335916	Gaming operations compliance officer		X	X
2019-343401	Chef			
2019-351101	Computer operator			X
2019-351201	ICT communications assistant			
2019-351301	Computer network technician			
2019-351303	Marine GIS technician			
2019-421102	Bank worker		X	X
2019-422204	Contact centre resource planner			
2019-422205	Contact centre forecast analyst			
2019-441903	Program or project administrators			X
2019-516301	Funeral director	X		X
2019-641201	Bricklayer			X
2019-641402	Fibre-cement moulder			X
2019-641501	Carpenter and joiner			

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	EXCLUDE ACCORDING TO THE FOLLOWING: "X" INDICATES THAT AN OCCUPATION MET AN EXCLUSION CRITERION		
		HIGH-PRIORITY SECTOR	SENSIBILITY CRITERIA	INDEX SCORE
2019-641502	Carpenter			
2019-641503	Joiner			
2019-642302	Plasterer			X
2019-642601	Plumber			X
2019-642607	Pipe fitter			X
2019-651101	Moulder			X
2019-651202	Welder			X
2019-651302	Boiler maker			
2019-651501	Rigger			X
2019-652301	Metal machinist			
2019-652302	Fitter and turner			
2019-653101	Automotive motor mechanic			X
2019-653301	Industrial machinery mechanic			
2019-653303	Mechanical fitter			
2019-653306	Diesel mechanic			
2019-662202	Small offset lithography operator			X
2019-671101	Electrician			
2019-671202	Millwright			
2019-671203	Mechatronics technician			
2019-671204	Lift mechanic			
2019-671205	Weapon systems mechanic			
2019-671206	Electrical equipment mechanic			
2019-671207	Armature winder			
2019-671208	Transportation electrician			
2019-671301	Electrical line mechanic			X
2019-672104	Electronic equipment mechanician			X
2019-681103	Butcher			X
2019-681201	Confectionary baker			X
2019-682303	Wood machinist			X
2019-684305	Quality controller (manufacturing)			
2019-684901	Textile, clothing, footwear, and leather processing machine mechanic			X

5.5.2 Stakeholder feedback on the South African CSL

It is important to note here that the stakeholder validation process is done with the list produced using the criteria of the four dimensions. This ensures that the desktop validation process does not exclude any occupations for which a stakeholder may have a good argument to include on the CSL.

As the custodians of the list, validation from the DHA is critical. Above and beyond the discussions held between the authors of the report and the DHA during the process of drafting the preliminary CSL, the DHA will have its own validation and consultation process that finalises the CSL.

However, comments were also received from several industry bodies and representatives through various channels. If good evidence for the inclusion or exclusion of an occupation was provided, the suggestions were incorporated into the CSL presented in section 6. This was all to ensure that the CSL was widely validated by a variety of stakeholders, meaning that the finalised CSL was representative of the skills needs of the Republic of South Africa.

Feedback was received from many stakeholders and their comments were received with the following two provisos:

1. That a representation made by a stakeholder needed to state whether there is a large surplus (for the occupation to be excluded from the final CSL) or severe shortfall (for the occupation to be included in the final CSL) of South African citizens available to fill a particular occupation; and
2. That the representation made by these stakeholders had some strong evidence proving the claims of either a shortfall or surplus of South African candidates able to fill occupational gaps within the country.

Given that these two provisos were applied to the finalisation of the CSL, only a handful of stakeholder representations are included in the finalised CSL.

To begin, the **South African Artisan Movement** made representation to exclude five occupations from the CSL: of these, one had already been excluded from the preliminary CSL. The remaining occupations in the following table will also be excluded from the preliminary CSL.

TABLE 16: Occupations excluded from the CSL by the Artisan Movement

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION
2019-653303	Mechanical fitter
2019-671101	Electrician
2019-671202	Millwright

The occupations in Table 16 were described as having a large number of qualified yet unemployed South African citizens who were not finding job placements. For this reason, there is sufficient evidence to exclude these occupations from the finalised CSL.

Some of the strongest feedback came from the **Business Process Enabling South Africa (BPESA)** Global Business Solutions critical skills survey conducted in 2019. Based on the findings of this survey BPESA provided convincing arguments for the inclusion of ten occupations, seven of which had already been included in the CSL.

TABLE 17: Occupations included due to BPESA input

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION
2019-122101	Sales and marketing manager
2019-242208	Organisational risk manager
2019-252901	ICT security specialist
2019-262202	Information services manager
2019-422204	Contact centre resource planner
2019-422205	Contact centre forecast analyst

Next, representations regarding the **tertiary education sector** noted that “2019-231101: University lecturer”, should be excluded from the CSL draft. Based on the desktop validation exercise, this occupation had already been excluded. However, given the balance of evidence, it is set to be included into the CSL based on the various Classification of Education Subject Matter (CESM) fields for which university lecturers are in shortage.

Prior to an analysis of the most recent South African data on student headcount and full-time equivalent numbers per CESM, it bears mentioning that evidence as to whether academics are in shortage in the country or not is ambiguous. While representations made by various academics point out that there is a surplus of South African PhD graduates who are able to fill lecturing positions in the country (whose validity is triangulated by the high number of unemployed graduates registered in the JOI database), other studies suggest that South Africa is in the midst of a lecturer shortage.

For instance, Heather Dugmore (2019) from the Weekend Post points out that South Africa’s 23 universities will be short of 7,000 academics by 2020 (Dugmore, 2019). This shortage is being somewhat curtailed by the New Generation of Academics Programme that employs young university lecturers still to complete their masters or PhDs.

However, primary research into headcount per full-time equivalent (FTE) staff shows that some CESM student numbers are outgrowing lecturing staff by a substantial margin. Indeed, in all but seven of the 23 CESM fields, student growth has exceeded lecturing staff growth.

TABLE 18: Student headcount per FTE staff member across CESM classification in South Africa

CESM	2015 (STUDENTS PER FTE STAFF MEMBER)	2018 (STUDENTS PER FTE STAFF MEMBER)	GROWTH (2015–2018)
Psychology	44	57	30%
Music	14	17	21%
Law	56	67	20%
Other visual/performance arts	32	38	19%
Physical sciences	22	26	18%

CESM	2015 (STUDENTS PER FTE STAFF MEMBER)	2018 (STUDENTS PER FTE STAFF MEMBER)	GROWTH (2015–2018)
Agriculture, agricultural operations, and related sciences	34	39	15%
Architecture and the built environment	37	42	14%
Visual arts	17	19	12%
Languages, linguistics, and literature	18	20	11%
Life sciences	20	22	10%
Family ecology and consumer sciences	21	23	10%
Engineering	53	58	9%
Computer and information sciences	40	43	8%
Education	98	105	7%
Philosophy, religion, and theology	19	20	5%
Social sciences	44	45	2%
Health professions and related clinical sciences (human)	26	26	0%
Health Professions and Related Clinical Sciences (other)	16	16	0%
Military sciences	1	1	0%
Public management and services	74	72	–3%
Mathematics and statistics	19	18	–5%
Business, economics, and management studies	71	53	–25%
Communication, journalism, and related studies	52	25	–52%

Source: Researchers' analysis of data collected from IDSC (2019) that details, per CESM, the total number of students enrolled and the total number of FTE staff members available across 26 South African universities (private and public, as well as universities of technology)

Based on the ratio dynamics illustrated in Table 18, the balance of evidence suggests that university lecturers should be included into the draft CSL. However, as is the case with all occupations at a six-digit level, there are underlying specialisations in each occupation. It is therefore suggested that the DHA, when taking this list forward, ensures that the specific CESM is included as a specification with regard to their final list of critical skills.

Finally, **XPATWEB** (a private company that conducts its own critical skills survey) sent out questionnaires to a total of 178 individual firms, businesses, and government organisations in 2019 (XPATWEB, 2019/20). The survey aimed to understand the “top 10 most difficult occupations to recruit in South Africa”. While the XPATWEB definition of occupations differs slightly from the OFO, this survey has provided a high-level look at occupation clusters that are extremely difficult to recruit for in South Africa.¹³

¹³ Instead of assessing whether an “electrician” is difficult to recruit for, XPATWEB’s survey identified that artisans were in high demand. XPATWEB’s approach is, therefore, more top-down than the approach followed by the current CSL methodology. Instead of asking businesses to choose which occupation clusters are critical, the CSL up until this point has looked at narrowing down a CSL from the list of 1,510 occupations found in the OFO.

Given this backdrop, the 2019 survey results from XPATWEB suggest that the following occupational clusters are difficult to hire for in the country:

1. Engineers;
2. ICT specialists;
3. Artisans;
4. C-Suite executives;
5. Senior financial executives;
6. Healthcare professionals;
7. Media and marketing specialists;
8. Foreign language speakers;
9. Science professionals; and
10. STEM teachers

While the approaches between XPATWEB and the research employed for this report differ, the findings of both pieces of research show significant overlap. In fact, of the 32 occupations mentioned by the XPATWEB report, for which OFO codes could be mapped, 24 were already included in the pre-validation list. Given the quality of the evidence, Table 19 lists a further four occupations that have been re-included after having been excluded by the desktop validation process. The following framework has been used to identify these occupations:

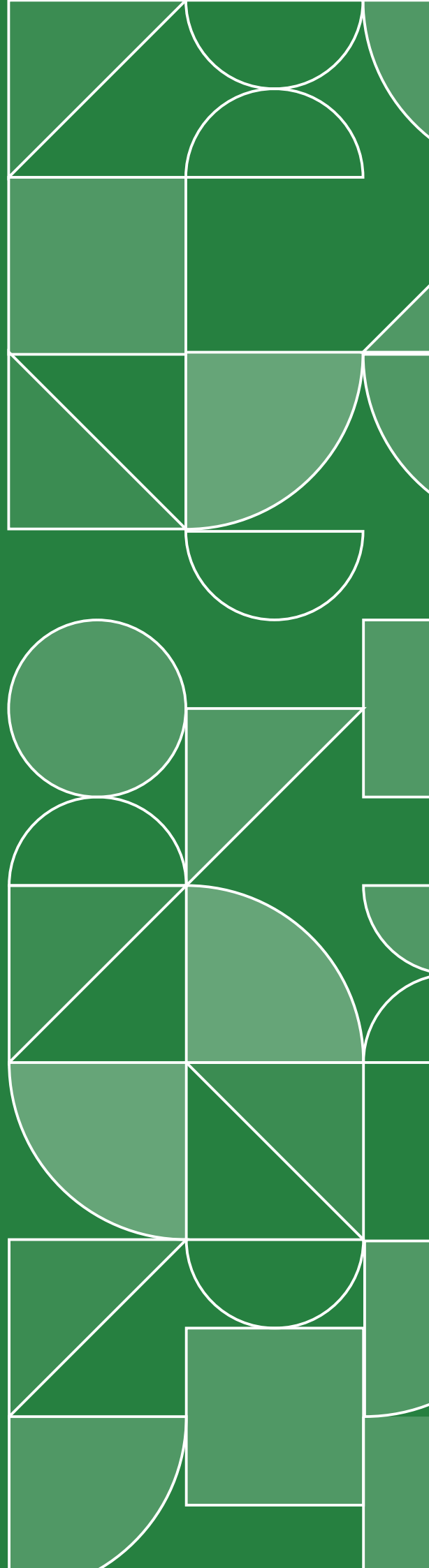
- If in XPATWEB results, but not in the pre-validation list: occupation remains excluded;
- If in XPATWEB results, and in post-validation list: occupation remains included (agreement in results);
- If in XPATWEB results, and not in post-validation list: occupation is re-included (Table 19).

TABLE 19: Re-included based on results of XPATWEB survey

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION
2019-214402	Mechanical engineering technologist
2019-132104	Engineering manager
2019-214101	Industrial engineer
2019-214102	Industrial engineering technologist
2019-652302	Fitter and turner
2019-222103	Registered nurse (child and family health)
2019-222110	Registered nurse (mental health)
2019-122102	Sales manager
2019-212101	Actuary
2019-213205	Food and beverage scientist
2019-251401	Applications programmer
2019-252302	Network analyst
2019-214904	Quantity surveyor

PART 6

Presenting the preliminary CSL ready for finalisation by the DHA



The preliminary CSL is put forward in this section, ready for finalisation by the DHA. Next to each occupation is an indication of the **minimum qualification** required by said occupation. It should be noted that these qualifications represent the bare minimum requirement for obtaining a job position, but that further study would increase the chances for an individual to gain employment within their chosen field. Therefore, these minimum qualifications must be understood merely as sign-posts, as opposed to prescriptive indicators.

Importantly, because the CSL is set to inform immigration policy, next to each occupation is also an indication of whether a foreign national applying for a particular occupation requires any specific professional body or licensing approval. This gaining of additional approval potentially feeds into the general process that must be followed by foreign nationals looking to work in South Africa. The process is summed up as follows:

1. Confirmation is required, in writing, from the accredited professional body, council, or board recognised by the South African Qualifications Authority (SAQA), or any relevant government department confirming the skills or qualifications of the applicant and appropriate post-qualification experience where applicable;
2. Proof of application for certificate of registration with the accredited professional body, council, or board recognised by SAQA;
3. Proof of evaluation of the foreign qualification by SAQA, translated by a sworn translator into one of the official languages of the Republic;
4. Proof of employment within 12 months after obtaining a critical skills work visa in the form of an employment contract specifying the occupation and capacity in which the foreigner shall be employed.

Given this context in the application processes, the following list (found in Table 20) summarises the preliminary version of the CSL.¹⁴

As a reminder, the colour-coding relates to the possible impacts of the COVID-19 pandemic:

Highlighted in **green** if the sector within which an occupation is housed is expected to:

- Recover relatively quickly from the impact of COVID-19; or
- Show signals of increased labour demand due to COVID-19.

Highlighted in white/not highlighted if the sector within which an occupation is housed is expected to:

- Recover from the impact of COVID-19 in a moderate timeframe; or
- Labour demand is expected to be ambiguously affected by COVID-19 in the sector; or
- Labour demand is not expected to change due to the impact of COVID-19.

Highlighted in **red** if the sector within which an occupation is housed is expected to:

- Recover slowly from the impact of COVID-19; or
- Show signals of decreased labour demand due to COVID-19.

¹⁴ This preliminary list will be finalised and gazetted officially by the Department of Home Affairs to inform immigration policy.

Further notation in the table relates to the asterisk (*) accompanying several occupations. Asterisks indicate that an occupation also appeared in the DEL's Employment Services South Africa (ESSA) work seekers database as of 14 September 2020. There are several reasons why there appear to be so many unemployed work seekers in occupations that are in the CSL. These include the following:

- a. Geographical dynamics. Given that the CSL reflects a national picture of occupational demand and does not therefore take into account provincial or local variations in occupational demand, it is to be expected that work seekers in the ESSA database could be living in geographical areas where occupational demand is lower than national demand.
- b. Timing of data availability. The CSL is based on some data that is two years old (for example, wages data), whereas the ESSA database reflects information as of 14 September 2020. This misalignment in the timing of information occupational supply and demand could explain why an occupation is in shortage while there are recorded numbers of unemployed as per the ESSA database.
- c. Impact of COVID-19. The data about work seekers from the ESSA database is very recent; it captures devastating impact of COVID-19 on employment. On the other hand, the CSL is based on data that goes beyond the immediate and short-term effect of COVID-19.

Bearing this in mind, Table 20 summarises the preliminary CSL ready for finalisation by the DHA, containing a total of 126 occupations. The order of occupations listed has no relation to priority, but rather follows the ordering of the OFO.

TABLE 20: Preliminary Critical Skills List (CSL) for finalisation by the DHA

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-121301	Policy and planning manager	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Directors in South Africa will be preferable
2019-122101	Sales and marketing manager	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-122301	Research and development manager	Diploma or advanced certificate (NQF Level 6)	No	
2019-131101	Agricultural farm manager	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-132101	Manufacturer	Diploma or advanced certificate (NQF Level 6)	No	
2019-132102	Manufacturing operations manager	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-132104	Engineering manager*	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	Engineering Council of South Africa
2019-132301	Construction project manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Council for Project and Construction Management Professions
2019-132407	Airport or harbour manager	Diploma or advanced certificate (NQF Level 6)	No	
2019-133101	Chief information officer	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-133102	ICT project manager	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-133103	Data management manager	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-133104	Application development manager	Bachelor's degree or advanced diploma (NQF Level 7)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-133105	Information technology manager	Bachelor's degree or advanced diploma (NQF Level 7)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-133106	Information systems director*	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-134502	FET college principal*	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Council for Educators
2019-143905	Call or contact centre manager	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Contact Centre Management Group will be preferable
2019-143906	Caravan park and camping ground manager	Diploma or advanced certificate (NQF Level 6)	No	
2019-143907	Dockmaster	Diploma or advanced certificate (NQF Level 6)	No	
2019-143908	Travel accommodation inspector	Diploma or advanced certificate (NQF Level 6)	No	
2019-143909	Travel agency manager	Higher certificate (NQF Level 5)	No	Membership in the Association of Southern African Travel Agents will be preferable
2019-211401	Geologist	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Council for Natural Scientific Professions
2019-211402	Geophysicist	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Council for Natural Scientific Professions
2019-211403	Materials scientist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Council for Natural Scientific Professions
2019-211405	Mineralogist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Council for Natural Scientific Professions
2019-211406	Hydrologist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Council for Natural Scientific Professions



6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-211407	Oceanographer	Diploma or advanced certificate (NQF Level 6)	Yes	South African Council for Natural Scientific Professions
2019-212101	Actuary*	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Actuarial Society of South Africa
2019-213205	Food and beverage scientist*	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-214101	Industrial engineer*	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Engineering Council of South Africa
2019-214102	Industrial engineering technologist*	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Engineering Council of South Africa
2019-214201	Civil engineer	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Engineering Council of South Africa
2019-214202	Civil engineering technologist	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Engineering Council of South Africa
2019-214401	Mechanical engineer*	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	Engineering Council of South Africa
2019-214402	Mechanical engineering technologist*	Diploma or advanced certificate (NQF Level 6)	Yes	Engineering Council of South Africa
2019-214403	Aeronautical engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	Engineering Council of South Africa
2019-214404	Aeronautical engineering technologist	Diploma or advanced certificate (NQF Level 6)	Yes	Engineering Council of South Africa
2019-214405	Naval architect	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-214904	Quantity surveyor*	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Council for the Quantity Surveying Profession
2019-214905	Agricultural engineer	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-214906	Agricultural engineering technologist*	Diploma or advanced certificate (NQF Level 6)	No	

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-216101	Architect	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Council for the Quantity Surveying Profession
2019-216601	Digital artist	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-216603	Multimedia designer	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-216604	Web designer	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-221101	General medical practitioner*	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	Health Professions Council of South Africa
2019-222103	Registered nurse (child and family health)*	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Nursing Council
2019-222104	Registered nurse (community health)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Nursing Council
2019-222108	Registered nurse (medical)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Nursing Council
2019-222109	Registered nurse (medical practice)	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Nursing Council
2019-222110	Registered nurse (mental health)*	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Nursing Council
2019-222114	Nurse educator	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	Yes	South African Nursing Council
2019-226201	Hospital pharmacist	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Pharmacy Council
2019-226202	Industrial pharmacist	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Pharmacy Council
2019-226203	Retail pharmacist	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Pharmacy Council



6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-231101	University lecturer ¹⁵	Master's degree (NQF Level 9)	No	
2019-241101	General accountant	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	There are a number of professional bodies dealing with accounting; the person needs to register with one of those many bodies
2019-241102	Management accountant	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Chartered Institute of Management Accountants
2019-241103	Tax professional	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	South African Institute of Tax Practitioners
2019-241104	External auditor	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Independent Regulatory Board for Auditors
2019-241106	Accountant in practice	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	There are a number of professional bodies dealing with accounting; the person needs to register with one of those many bodies
2019-241107	Financial accountant	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Institute of Accounting and Commerce
2019-241108	Forensic accountant*	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	There are a number of professional bodies dealing with accounting; the person needs to register with one of those many bodies
2019-241201	Investment analyst	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Financial Planning Institute of Southern Africa will be preferable
2019-241202	Investment manager*	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Financial Planning Institute of Southern Africa will be preferable

¹⁵ See Appendix 3 for the list of academic fields included.

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-241203	Investment advisor	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Financial Planning Institute of Southern Africa will be preferable
2019-241301	Financial investment advisor	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Financial Planning Institute of Southern Africa will be preferable
2019-242101	Management consultant	Bachelor's degree or advanced diploma (NQF Level 7)	No	Membership in the Institute of Management Consultants and Master Coaches of South Africa will be preferable
2019-242102	Organisation and methods analyst	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-242103	Business development officer	Diploma or advanced certificate (NQF Level 6)	No	
2019-242202	Policy analyst*	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-242203	Company secretary	Occupational certificate (NQF Level 8)	No	Membership in the Institute of Management Consultants and Master Coaches of South Africa will be preferable
2019-242208	Organisational risk manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-242209	Accounting officer	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	There are a number of professional bodies dealing with accounting; the person needs to register with one of those many bodies
2019-242210	Business administrator*	Bachelor's degree or advanced diploma (NQF Level 7)	No	Membership in the Institute of Management Consultants and Master Coaches of South Africa will be preferable



6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-242211	Internal auditor	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Independent Regulatory Board for Auditors
2019-242213	Regulatory affairs officer	Diploma or advanced certificate (NQF Level 6)	No	
2019-242214	Intellectual property special advisor	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-242215	Fraud examiner	Bachelor honours degree, postgraduate diploma, occupational certificate or bachelor's degree (NQF Level 8)	No	Membership in the Association of Certified Fraud Examiners South Africa will be preferable
2019-243101	Advertising specialist	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Marketing Association of South Africa will be preferable
2019-243102	Market research analyst	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Southern African Marketing Research Association will be preferable
2019-243103	Marketing practitioner	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Marketing Association of South Africa will be preferable
2019-243104	Market campaign analyst*	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Marketing Association of South Africa will be preferable
2019-243201	Communication coordinator	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Marketing Association of South Africa will be preferable
2019-243202	Communication strategist	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Marketing Association of South Africa will be preferable

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-243203	Corporate communication manager	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-251101	ICT systems analyst	Bachelor's degree or advanced diploma (NQF Level 7)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-251102	Data scientist	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-251201	Software developer	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-251202	Programmer analyst	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-251203	Developer programmer	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-251301	Multimedia specialist	Bachelor's degree or advanced Diploma (NQF Level 7)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-251302	Web developer	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-251401	Applications programmer	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-251901	Computers quality assurance analyst*	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable



6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-252101	Database designer and administrator	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-252302	Network analyst	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-252901	ICT security specialist	Diploma or advanced certificate (NQF Level 6)	No	Membership in the Institute of Information Technology Professionals South Africa will be preferable
2019-262202	Information services manager	Bachelor's degree or advanced diploma (NQF Level 7)	Yes	Professional Librarian Library Association of South Africa
2019-311501	Mechanical engineering technician	Diploma or advanced certificate (NQF Level 6)	Yes	
2019-311502	Pressure equipment inspector	Diploma or advanced certificate (NQF Level 6)	Yes	
2019-311503	Aeronautical engineering technician	Diploma or advanced certificate (NQF Level 6)	Yes	Engineering Council of South Africa
2019-311801	Draughtsperson	Higher certificate (NQF Level 5)	Yes	South African Council for the Architectural Profession
2019-312201	Production/operations supervisor (manufacturing)	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-331401	Statistical and Mathematical Assistant	Bachelor honours degree, postgraduate diploma, or bachelor's degree (NQF Level 8)	No	
2019-333401	Property manager	Bachelor's degree or advanced diploma (NQF Level 7)	No	
2019-343401	Chef	National certificate or occupational certificate (NQF Level 4)	Yes	South African Chefs Association

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-351201	ICT communications assistant	Diploma or advanced certificate (NQF Level 6)	No	
2019-351301	Computer network technician	Diploma or advanced certificate (NQF Level 6)	No	
2019-351303	Marine GIS technician	Higher certificate (NQF Level 5)	No	
2019-422204	Contact centre resource planner	Diploma or advanced certificate (NQF Level 6)	No	
2019-422205	Contact centre forecast analyst	National certificate (NQF Level 4)	No	
2019-641501	Carpenter and joiner	National certificate or occupational certificate (NQF Level 4)	No	
2019-641502	Carpenter	National certificate or occupational certificate (NQF Level 4)	No	
2019-641503	Joiner	National certificate or occupational certificate (NQF Level 4)	No	
2019-652301	Metal machinist*	National certificate or occupational certificate (NQF Level 4)	No	
2019-652302	Fitter and turner*	National certificate or occupational certificate (NQF Level 4)	No	
2019-653301	Industrial machinery mechanic	National certificate or occupational certificate (NQF Level 4)	No	
2019-653306	Diesel mechanic	National certificate or occupational certificate (NQF Level 4)	No	
2019-671203	Mechatronics technician	National certificate or occupational certificate (NQF Level 4)	No	
2019-671204	Lift mechanic	National certificate or occupational certificate (NQF Level 4)	No	



6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	MINIMUM QUALIFICATION REQUIRED	PROFESSIONAL OR LICENSE-TO-PRACTICE REQUIREMENTS	PROFESSIONAL BODY
2019-671205	Weapon systems mechanic	National certificate or occupational certificate (NQF Level 4)	No	
2019-671206	Electrical equipment mechanic*	National certificate or occupational certificate (NQF Level 4)	No	
2019-671207	Armature winder	National certificate or occupational certificate (NQF Level 4)	No	
2019-671208	Transportation electrician	National certificate or occupational certificate (NQF Level 4)	No	
2019-684305	Quality controller (manufacturing)	Higher certificate (NQF Level 5)	No	

Note:

Asterisks (*) indicates that an occupation has more than 500 unemployed graduates across the country, according to the ESSA database, as of 14 September 2020.

PART 7

Conclusion



Assessing skills shortages in a particular country is a task requiring a high-level of labour market insight. Even more challenging is the ability to assess whether those skills shortages will be transitory or whether they have embedded themselves in the labour market.

The primary aim of the CSL is to identify occupations that are in shortage and unlikely to be developed domestically in time to prevent the obstruction of economic growth potential in the short to medium term. The importance of accurately identifying these occupations cannot be understated. If the criteria for inclusion is too flexible, South African citizens are disadvantaged; too strict and the economy suffers.

This report was driven by the importance of transparency. Given how important, but also how challenging, the development of a CSL is, it is essential that the methodology and final result be open to scrutiny. The approach to creating this list aims to be objective and criteria-based. Nevertheless, some subjective judgement calls are necessary. Therefore, decision-making processes are made clear, allowing for the list to be understood within the context of its criteria and judgement calls.

It is important to note that the list presented as preliminary in this report covers more occupations than those that will eventually be included in the final CSL to be officially gazetted by DHA. The DHA will narrow this list down further to ensure that all occupations for which immigration preference is offered to foreign nationals are those that are “most critical” for the development of the country.

Appendix 1: Robustness analysis

A 1.2 List of occupations passing dimension 1: Equal weighting

The 2018 OIHD report employs an “equal-weighting-within” approach. In it, similar to the CSL, there are a handful of indicators, clustered into four different dimensions (wage pressure, employment pressure, vacancy pressure, and strategic priority).

Therefore, in using this “equal-weighting” approach, each dimension receives a weight of $\frac{1}{4}$. That weight is distributed evenly across each indicator within the dimension. For example, assuming that the wage pressure dimension had three indicators, each indicator would receive $\frac{1}{12}$ as a weight, and this adds up to a total weight of $\frac{1}{4}$ for the wage pressure dimension.

In terms of the CSL, there are five sub-dimensions, which will be weighted $\frac{1}{5}$ equally. At an indicator level, these weightings are summarised below:

TABLE A 1: Equal-weighting summary for dimension 1 of the CSL

SUB-DIMENSION	INDICATOR	WEIGHT ATTACHED TO EACH INDICATOR	WEIGHT ATTACHED TO EACH DIMENSION
HTFVs	The growth rate of the number of vacancies that take longer than six months to fill.	$\frac{1}{15}$	$\frac{1}{5}$
	The proportion of vacancies that take longer than six months to fill.	$\frac{1}{15}$	
	The proportion of vacancies re-advertised within the year.	$\frac{1}{15}$	
Vacancy growth	Change in vacancy growth	$\frac{1}{5}$	$\frac{1}{5}$
Supply–demand	Demand (active candidates per OFO code) exceeds supply (employer adverts) over the past 12 months	$\frac{1}{5}$	$\frac{1}{5}$
Wage pressure	Hourly mean wage growth	$\frac{1}{15}$	$\frac{1}{5}$
	Hourly median wage growth	$\frac{1}{15}$	
	Conditional hourly mean wage growth	$\frac{1}{15}$	
Employment pressure	Employment intensity growth	$\frac{1}{5}$	$\frac{1}{5}$

When applying these equal weights, only 107 occupations were shown to be in acute shortage. These occupations, along with their overlap between occupations that passed either D1 or D2, are summarised in Table A 2:

TABLE A 2: Robustness analysis: Equally weighted indicator sub-dimensions

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	OVERLAP BETWEEN PCA LIST AND EQUALLY WEIGHTED LIST
2019-121101	Finance manager	In equally weighted list only
2019-121103	Credit manager	In equally weighted list only
2019-121104	Internal audit manager	In equally weighted list only
2019-122101	Sales and marketing manager	In equally weighted list only
2019-122102	Sales manager	In equally weighted list only
2019-122301	Research and development manager	In original PCA and in equally weighted list
2019-132401	Supply and distribution manager	In equally weighted list only
2019-132402	Logistics manager	In equally weighted list only
2019-132403	Road transport manager	In equally weighted list only
2019-132404	Warehouse manager	In equally weighted list only
2019-132407	Airport or harbour manager	In equally weighted list only
2019-133101	Chief information officer	In equally weighted list only
2019-133102	ICT project manager	In equally weighted list only
2019-133103	Data management manager	In equally weighted list only
2019-133104	Application development manager	In equally weighted list only
2019-133105	Information technology manager	In equally weighted list only
2019-133106	Information systems director	In equally weighted list only
2019-141201	Café (licensed) or restaurant manager	In original PCA and in equally weighted list
2019-141202	Licensed club manager	In original PCA and in equally weighted list
2019-141203	Catering production manager	In original PCA and in equally weighted list
2019-141204	Reservations manager	In original PCA and in equally weighted list
2019-214101	Industrial engineer	In equally weighted list only
2019-214102	Industrial engineering technologist	In equally weighted list only
2019-214201	Civil engineer	In equally weighted list only
2019-214202	Civil engineering technologist	In equally weighted list only
2019-216101	Architect	In original PCA and in equally weighted list
2019-221101	General medical practitioner	In equally weighted list only
2019-222103	Registered nurse (child and family health)	In equally weighted list only
2019-222104	Registered nurse (community health)	In equally weighted list only
2019-222108	Registered nurse (medical)	In equally weighted list only

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	OVERLAP BETWEEN PCA LIST AND EQUALLY WEIGHTED LIST
2019-222109	Registered nurse (medical practice)	In equally weighted list only
2019-222110	Registered nurse (mental health)	In equally weighted list only
2019-222114	Nurse educator	In equally weighted list only
2019-241101	General accountant	In original PCA and in equally weighted list
2019-241102	Management accountant	In original PCA and in equally weighted list
2019-241103	Tax professional	In original PCA and in equally weighted list
2019-241104	External auditor	In original PCA and in equally weighted list
2019-241106	Accountant in practice	In original PCA and in equally weighted list
2019-241107	Financial accountant	In original PCA and in equally weighted list
2019-241108	Forensic accountant	In original PCA and in equally weighted list
2019-251201	Software developer	In original PCA and in equally weighted list
2019-251202	Programmer analyst	In original PCA and in equally weighted list
2019-251203	Developer programmer	In original PCA and in equally weighted list
2019-251301	Multimedia specialist	In original PCA and in equally weighted list
2019-251302	Web developer	In original PCA and in equally weighted list
2019-251901	Computers quality assurance analyst	In original PCA and in equally weighted list
2019-311501	Mechanical engineering technician	In equally weighted list only
2019-311502	Pressure equipment inspector	In equally weighted list only
2019-311503	Aeronautical engineering technician	In equally weighted list only
2019-311801	Draughtsperson	In equally weighted list only
2019-331301	Bookkeeper	In original PCA and in equally weighted list
2019-331302	Accounting technician	In original PCA and in equally weighted list
2019-331303	Tax technician	In original PCA and in equally weighted list
2019-332201	Commercial sales representative	In original PCA and in equally weighted list
2019-332202	Sales representative (building and plumbing supplies)	In original PCA and in equally weighted list
2019-332203	Sales representative (personal and household goods)	In original PCA and in equally weighted list
2019-332204	Commercial services sales agent	In original PCA and in equally weighted list
2019-332205	Manufacturers representative	In original PCA and in equally weighted list
2019-332206	Sales representative (photographic equipment and supplies)	In original PCA and in equally weighted list
2019-332207	Chemical sales representative	In original PCA and in equally weighted list
2019-332208	Pharmacy sales assistant	In original PCA and in equally weighted list
2019-334301	Secretary bargaining council	In original PCA and in equally weighted list
2019-334302	Personal assistant	In original PCA and in equally weighted list

6-DIGIT OFO CODE	6-DIGIT OFO DESCRIPTION	OVERLAP BETWEEN PCA LIST AND EQUALLY WEIGHTED LIST
2019-343401	Chef	In original PCA and in equally weighted list
2019-422101	Tourist information officer	In original PCA and in equally weighted list
2019-422102	Travel consultant	In original PCA and in equally weighted list
2019-431101	Accounts clerk	In original PCA and in equally weighted list
2019-431102	Cost clerk	In original PCA and in equally weighted list
2019-431103	Taxation clerk	In original PCA and in equally weighted list
2019-522301	Sales assistant (general)	In original PCA and in equally weighted list
2019-522302	Motorised vehicle or caravan salesperson	In original PCA and in equally weighted list
2019-522303	Automotive parts salesperson	In original PCA and in equally weighted list
2019-522304	ICT sales assistant	In original PCA and in equally weighted list

Only 31 occupations appear in the equally weighted list but do not appear in the PCA-weighted list. This suggests that the overlap is quite substantial between weighting methods. However, because the PCA calculates weights that are more objectively defined, the PCA methodology is more robust as a piece of statistical evidence.

That said, the 31 occupations that do not appear in the PCA-weighted list have also been subject to validation, and they will be added into the final CSL if it is believed that they are in dire shortage in the country.

Appendix 2: List of stakeholder meetings, semi-structured interviews (SSI), and gazette comments

In order to corroborate the findings of the draft CSL, major focus was placed on discussions between the research team and the DHA, the DTIC, and the DEL. Beyond these representations, where individuals gave strong evidence to suggest that a sufficient/insufficient number of unemployed South Africans were available to fulfil a role, occupations were either excluded or included from or into the finalised CSL.

The stakeholders that had input into the finalisation of the CSL are as follows:

TABLE A 3: List of stakeholders contacted by DNA Economics and the DHET, and modalities through which communication was made

STAKEHOLDER	MODALITY OF COMMUNICATION
BPESA	Stakeholder workshop
DHA	Stakeholder workshop
DTIC	Stakeholder workshop
DEL	Stakeholder workshop
The South African Artisan Movement	Gazette public comment
W&R SETA	Gazette public comment
XPATWEB	Stakeholder workshop

Appendix 3: Fields of study and specialisation included under university lecturer

CESM	SPECIALISATION
Accounting and Informatics	<ul style="list-style-type: none"> accounting (CA, SA) actuarial science auditing financial accounting financial planning – certified financial planner with academic qualifications financial econometrics and technical analysis financial management entrepreneurship management accounting
Agricultural, Environmental, and Natural Sciences	<ul style="list-style-type: none"> agricultural economist agricultural engineering agricultural policy development agronomy: weed science analytical chemists and hydro metallurgists animal scientist bioinformatics bio-informatics crop science data analytics / statistics / biometry dendrochronology dairy science occupational code disaster management entomology earth system science economic geology exposure biology epidemiology/food microbiology food engineering food scientist food safety forest planner food processing and storage technology forest resource management and planning genetics: applied plant breeding geology geography ground water hydrology hydrogeology mathematics mathematical statistics meat science microbiology and biochemistry mining geology molecular biophysics natural resource economics nematology physics plant science plant breeding plant pathology, especially epidemiology plant taxonomy and systematics plant ecology plant sciences statistics soil science software developers (agricultural) structural biology surface process geochemistry surface and soil water hydrology risk analyst veterinary science viticulturist zoology (aquatic scientist; animal scientist; biological scientist; ecological scientist)
Arts: Design and Social Sciences	<ul style="list-style-type: none"> arts entrepreneurship communication and media criminology geography and environmental studies git geomatics urban and regional planners (professionally registered) geographical information systems environmental epidemiology graphic design fashion design fashion and textile information science artificial intelligence data science cybersecurity and cyberwarfare socio-informatics information science artificial intelligence data science cybersecurity and cyberwarfare socio-informatics interior design journalism, film and television Afrikaans and Dutch African languages and culture foreign languages (Chinese, French, German, Dutch) general linguistics and modern languages language acquisition in Afrikaans linguistics literature, heritage and culture theory of translation and interpretation theory of lexicography library and information science music music: strings players ethnomusicology experts (especially African music, essential for the renewal of the curriculum) music in the fields of music technology and music therapy and community music political science / international relations sociology social science (research methods and particularly quantitative data analysis) monitoring and evaluation specialists science policy analysts visual arts digital production and/or graphic design communication and media applied virtual/augmented reality
Business Studies	<ul style="list-style-type: none"> business innovation change management corporate governance development finance HR information systems and technology entrepreneurship management financial planning finance/investment investments local governance international business operations management: productivity ergonomics, operations management project management responsible leadership safety management technology management
Commerce	<ul style="list-style-type: none"> information systems macroeconomic microeconomic professorial staff in accounting senior staff in actuarial science organisational psychology tax
Economics	<ul style="list-style-type: none"> behavioural and experimental economics cliometrics data analytics econometrics environmental economics health economics industrial policy international trade industrial organisation macroeconomics political economy

CESM	SPECIALISATION
Education	<ul style="list-style-type: none"> ● accounting education ● African languages ● Afrikaans ● aeronautical engineering ● chemistry education ● critical management education ● curriculum studies ● early childhood care and education (ecce) ● educational psychology ● education research ● English (in faculty of education) ● geography ● higher education studies, especially higher education leadership; educational finance and student affairs ● linguists: formal, forensic, digital ● mathematics education ● mechanical engineering ● mechatronics ● medical laboratory sciences: in disciplines such as clinical, chemistry, cytology, histology ● methodology/health/sport/physical education and or sports coaching ● movement education ● music (specialised) ● physical science ● technology (civil, mechanical and electrical) ● science (biology, life science, chemistry and physics) ● physics education ● science and technology education ● special education ● social sciences education
Management Sciences	<ul style="list-style-type: none"> ● administration and economics management ● actuarial science ● chartered accountants ● financial risk management ● general economics ● hospitality ● information systems ● logistics management ● macro and micro econometrics ● management ● mineral economics ● operation management ● project management ● statistics ● mathematical statistics (including distribution theory) ● statistical modelling, inference ● biostatistics / biometrics including spatial statistics/geostatistics and survival analysis ● extreme value theory ● statistical process control ● statistics of data science and machine learning ● supply chain management (SCM) ● transport economics
Engineering and the Built Environment	<ul style="list-style-type: none"> ● agricultural engineering ● architecture ● bio and water engineering ● biomedical engineering ● civil engineering ● transport engineering ● structural engineering ● urban engineering ● geotechnical engineering ● water resource engineering ● construction engineering ● quantity surveying ● chemical engineering ● bioprocessing engineering ● biochemical engineering ● biomolecular engineering ● process modelling ● simulation engineering ● clinical engineering ● computer engineering ● construction management ● construction project management ● control engineering ● corrosion ● data science ● digital construction technology ● data engineering ● economic geology ● electrical engineering ● electronics engineering ● electrical power engineering ● energy engineering ● engineering management ● environmental engineering ● explosive engineering (explosive rock engineering) ● facilities management ● geotechnical engineering ● geomatics ● mine surveying ● mineral resources management ● mineral economics ● photogrammetry ● geostatistics ● geohydrologists and water resource scientist ● geostatistics (mineral resources and reserves evaluation) ● geotechnical engineering ● high voltage engineering ● hydrometallurgy ● industrial engineering ● instrumentation engineering ● intelligent systems ● jewellery design ● land surveyor ● materials engineer ● mechatronics engineering ● mechanical engineering ● metallurgical engineering ● mineral economics ● mining engineering ● mining surveying ● mine environmental engineering ● operation management ● petroleum engineering ● physical metallurgy ● planning programme ● power and energy ● process and control engineering ● production engineers ● property valuation and management – valuers registered with the South African property valuers profession ● property studies ● rock engineering (rock mechanics or geotechnical engineering) ● pyrometallurgy ● quantity surveying ● reactor design ● real estate and property studies ● structural engineering ● technology ● telecommunication engineering ● town and regional planning ● transportation engineering ● urban and regional planning ● ventilation engineering ● water engineering
Food Service Management	<ul style="list-style-type: none"> ● dietetics
Health Sciences	<ul style="list-style-type: none"> ● pharmacology ● clinical pharmacy ● psychology ● industrial psychology
Humanities	<ul style="list-style-type: none"> ● African languages ● anthropology ● biology education ● chemistry education ● clinical psychology ● history ● international relations ● leadership ● local languages education ● philosophy ● research psychologists ● political studies ● sign language linguistics ● sociology ● social work

CESM	SPECIALISATION
Information and Communications Technology	<ul style="list-style-type: none"> ● analysis and projection ● applied virtual/augmented reality ● artificial intelligence ● big data analytics; filtering ● business information systems ● business and systems analysts ● cloud computing ● cheminformatics ● computer forensics ● computer network professionals ● computer science ● cryptocurrency ● cyber security ● database and systems administrators ● data science ● digital government ● digital media in the fields of game design and animation and interactive media ● digital platform business models ● disaster informatics ● enterprise architecture ● expert systems ● cheminformatics ● health informatics ● infopreneurial skills ● ICT and data science: all fields ● ICT security specialists ● ICT support and computer science ● internet of things – 4IR skills ● information system and strategy ● IS auditing ● IS development ● IS security/cyber security ● ITS ● management information systems/ information technology management ● multimedia specialists and web developers ● project management ● retail analytics ● social media management ● software development ● software engineering ● software and applications programmers
Law	<ul style="list-style-type: none"> ● accountancy and law ● banking and finance law ● company law ● comparative law ● corporate finance law ● corporate law ● credit law ● criminal law and criminal procedure ● customary law ● cyber law ● environmental law ● intellectual property law ● international trade law ● international criminal law ● international law ● international commercial law ● international/global environmental law ● labour law ● law of evidence ● legal tech ● mercantile law ● mining law ● private international law ● procedural law ● public law ● public international law ● tax law ● technology/internet and the law ● transnational criminal law
Medicine and Health Sciences	<ul style="list-style-type: none"> ● academic pharmacy ● allied health professions and rehabilitation sciences including disciplines: audiology, hearing therapy, occupational therapy, physical medicine, physiotherapy, rehabilitation sciences and speech-language therapy) ● anaesthesiology and critical care (with disciplines including anaesthesiology and critical care medicine / intensive care medicine) ● bioinformatics ● biomaterials sciences ● biomedical engineering and medical data science (with disciplines including biomedical engineering, medical data science, health informatics and medical informatics) ● biomedical sciences (with disciplines including anatomy/clinical anatomy, andrology, bacteriology, biochemistry/medical biochemistry, bioinformatics and computational biology, biological sciences, biophysics, cancer biology, cell biology, cytology, developmental biology, electron microscopy, enzymology, genetics / human genetics, genomics and proteomics, histology, laboratory medicine, medical laboratory sciences, medical laboratory technology, medicinal chemistry, microbiome sciences, microscopy, molecular biology, morphology / morphological sciences, physiology/medical physiology, reproductive biology, synthetic biology, and vaccinology) ● biostatistics ● clinical pharmacy ● comparative medicine (with disciplines including laboratory animal sciences, animal technology, comparative medicine, and veterinary sciences) ● family and emergency medicine (with disciplines including emergency medicine, family medicine, hyperbaric medicine, palliative care and primary health care) ● global and public health (with disciplines including biostatistics, cancer science, community health, dietetics, environmental health, epidemiology, global surgery, global health, health economics, health systems, human nutrition, occupational health, preventive medicine, public health and rural health) ● educational technology ● emergency medical care ● environmental health ● exposure science ● foetal medicine ● health professions education ● human anatomy and physiology ● industrial pharmacy ● infertility ● maxillofacial ● medical ethics and medical law (with disciplines including medical ethics, and medical law/legal medicine)

CESM	SPECIALISATION
Medicine and Health Sciences <i>continued</i>	<ul style="list-style-type: none"> ● medical imaging and clinical oncology (with disciplines including medical physics, neuroimaging, nuclear medicine, oncology / radiation oncology, radiobiology, and radiodiagnosis) ● medicine (with disciplines including allergology, bariatric medicine, cardiology, clinical immunology, clinical pharmacology, dermatology, endocrinology, gastroenterology, general internal medicine, geriatrics and gerontology, haematology, hepatology, infectious diseases, environmental toxicology, metabolism, nephrology, neurology, proctology, pulmonology, rheumatology, toxicology, transfusion sciences, and venereology) ● neurosciences ● nursing and midwifery - specialised care lecturers in the areas of paediatrics, trauma, forensic nursing, oncology, neonatal ICU, wound care and infection control as well as stoma care ● obstetrics and gynaecology (with disciplines including gynaecology, gynecologic oncology, medical genetics, and obstetrics) ● occupational therapists ● occupational medicine ● oral medicine and periodontics ● paediatrics and child health (with disciplines including adolescent medicine, child health, neonatology, and paediatrics) ● pathology (with disciplines including anatomical pathology, chemical pathology, cytopathology, forensic medicine, haematological pathology, histopathology, immunology, microbiology / medical microbiology, parasitology, and virology / medical virology) ● paediatric dentistry ● pharmaceutical sciences ● plastic surgery ● psychiatry (with disciplines including addiction science, child and adolescent psychiatry, clinical psychology, forensic psychiatry, geriatric psychiatry, neuroscience, and psychiatry) ● physiotherapists ● physiology ● quality assurance and regulatory pharmacy ● radiation oncology ● sports science and sports medicine (with disciplines including biokinetics, exercise medicine, sports medicine, sport psychology and sport science) ● surgical sciences (with disciplines including cardiothoracic surgery, general surgery, neurosurgery, ophthalmology, orthopaedic surgery, otorhinolaryngology, paediatric surgery, plastic and reconstructive surgery, podiatric surgery, transplant surgery, urology, vascular surgery ● radiography (diagnostic radiology, interventional radiology) ● public health biostatistics application ● transplant surgery
Science	<ul style="list-style-type: none"> ● archaeobotanical ● applied mathematics ● astronomy ● astrophysics ● bioinformatics ● climate science ● computational geoscientists ● chemical sciences ● earth observation ● geological sciences ● geoarchaeology ● geographical information science ● inorganic chemistry ● materials science ● mathematics ● mathematical statistics ● mining geologists ● nanotechnology/nanoscience ● nuclear and particle physics ● oceanography ● physics ● population genetics ● radio astronomy ● remote sensing ● seismologists ● sensory science ● systematists/taxonomists in the biological sciences ● statistical sciences ● theoretical ● theoretical and computational sciences physics
Physics	<ul style="list-style-type: none"> ● few-body physics
Public Management and Administration	<ul style="list-style-type: none"> ● disaster and risk management ● public administration ● public management/cooperatives ● supply chain management ● research administration ● innovation management and administration ● digital research management ● research management ● research administration
Theology	<ul style="list-style-type: none"> ● ancient studies and classics ● religion studies

Source: USAf



PART 8

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