



**NATIONAL COMPETENCY STANDARDS
FOR
MOBILE APPLICATION DEVELOPER
(NC3)**

**Department of Occupational Standards
Ministry of Labour and Human Resources
Thimphu Bhutan
(January, 2019)**



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FOREWORD

The Department of Occupational Standards of the Ministry of Labour and Human Resources is pleased to present the revised version of National Competency Standards (NCSs) for Mobile Application Developer. The standards represent the fruits of hard work and invaluable experiences gained by the department since its establishment in the latter half of 2003. The main aim of developing NCS is to set up a well-defined nationally recognized Vocational Qualifications System that will help set a benchmark for the Technical Vocational Education and Training (TVET) System in our country aligned to international best practices.

NCS is one of the base pillars in the Bhutan Vocational Qualifications Framework (BVQF) and is the first step in its implementation. The NCS are developed and revised to ensure that employees or vocational graduates possess and acquire the desired competencies required by industries and employers. In order to ensure this close match in supply and demand of competencies, NCS have been developed and revised in close consultation and partnership with industry experts and validated by the Technical Advisory Committees of the concerned economic sectors.

A vocational education and training system based on NCS shall ensure that delivered training is of a high quality and relevant to the needs of the labour market. As a result, future TVET graduates will be better equipped to meet the need and expectations of industries and employers. This positive impact on the employability of TVET graduates will enhance the reputation of vocational education and training and make it attractive to school leavers.

I gratefully acknowledge collaboration and the valuable contributions made by experts from industries during the consultation and validation processes of the standards. I look forward for continued engagement and participation of the industry and employers in the development of a quality assured demand driven TVET system and to build competent and productive national workforce that will contribute to the continued socio-economic progress of our country.

Director
Department of Occupational Standards
Ministry of Labour and Human Resource

ACKNOWLEDGEMENT

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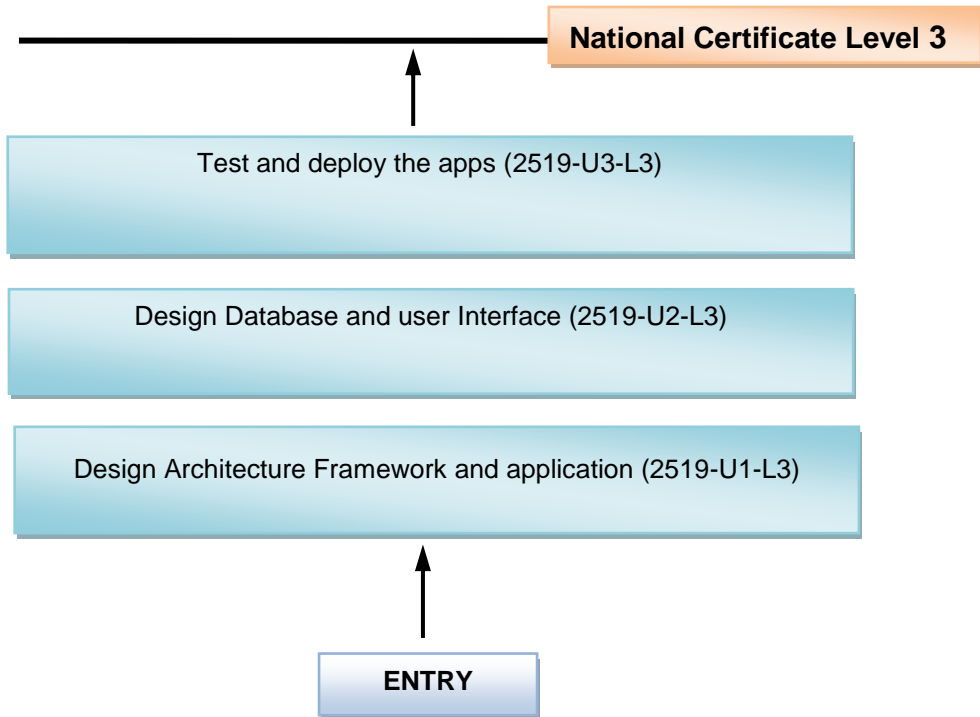
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PACKAGING OF QUALIFICATIONS

The National Competency Standards for Mobile Application Developer comprises three units of competencies which are clustered into following levels of qualifications.



OVERVIEW OF NATIONAL COMPETENCY STANDARDS

UNIT TITLE	ELEMENTS OF COMPETENCE
Design Architecture Framework and application	<ol style="list-style-type: none"><li>1. Develop framework<li>2. Build architecture framework<li>3. Select API and services
Design Database and user Interface	<ol style="list-style-type: none"><li>1. Select API calling<li>2. Design user interface
Test and deploy the apps	<ol style="list-style-type: none"><li>1. Test the apps<li>2. Launch the apps

UNIT TITLE : **Design architecture framework and application**

DESCRIPTOR : This unit covers the competencies required to develop framework, build architecture framework and select API and Services following standard procedures

CODE : **2519-U1-L3**

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Develop Framework	1.1 Select platform as per the job requirement following standard procedure 1.2 Obtain the requirements from the client as per the job requirement following standard procedures 1.3 Study and select the framework as per the job requirement following standard procedures
2. Build architecture framework	2.1 Select types of devices based on operating system following standard procedures 2.2 Select environment as per the job requirement following standard procedures 2.3 Develop architecture framework based on number of users, storage, memory, graphics following standard procedures 2.4 Build layers as per the standard procedures
3. Select API and services	3.1 Select Application Program Interface (API) to access data/third party application as per job requirement 3.2 Access the data and users as per the job requirement following standard procedures 3.3 Perform functions on layers (data, users)

	obtained through API for data analysis, user analysis following standard procedures
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RANGE STATEMENT	
Platform may include but not limited to:	
<ul style="list-style-type: none"> • IOS • Android 	<ul style="list-style-type: none"> • Native
Framework may include but not limited to:	
<ul style="list-style-type: none"> • Cross platform • Client side framework 	<ul style="list-style-type: none"> • Framework based on technology language
Types of services may include but not limited to:	
<ul style="list-style-type: none"> • Mobile • Desktop 	<ul style="list-style-type: none"> • Tablet
Environment may include but not limited to:	
<ul style="list-style-type: none"> • Server • Web based 	<ul style="list-style-type: none"> • App store
Layers may include but not limited to:	
<ul style="list-style-type: none"> • Presentation layer • Business layer 	<ul style="list-style-type: none"> • Data Layers
Critical Aspects:	
<ul style="list-style-type: none"> • Demonstrate compliance with safety regulations applicable to work operations at all times 	

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • OHS regulations • First Aid • Understanding of platforms • Basics of computer • Graphics User Interface (GUI) • Understanding of basic architectures • Understanding of layouts • Understanding of APIs • Basics of programming language • Software Development Life Cycle (SSDLC) • Life cycle of Apps 	<ul style="list-style-type: none"> • Communication • Interpersonal relationship • Team Work • Planning • Time management • Problem solving

UNIT TITLE : **Design database and user interface**

DESCRIPTOR : This unit covers the competencies required to design database and design data interface following standard procedures

CODE : **2519-U2-L3**

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Design database	1.1 Select database engines as per the job requirement following standard procedure 1.2 Structure the data as per the job requirement following standard procedure 1.3 Select the right network topology based on requirement following standard procedures 1.4 Perform data security and customization as per the standard procedures
2. Design user interface	2.1 Select the user interface as per the standard procedures 2.2 Prototype the user interface as per the job requirement following standard procedures 2.3 Design different screen resolutions as per the job requirement following standard procedures 2.4 Design graphics as per the user's requirement following standard procedures 2.5 Create navigation schemes/method as per requirement of the application

RANGE STATEMENT	
Database engines may include but not limited to:	
<ul style="list-style-type: none"> • Sqlite • Mongodb • Oracle 	<ul style="list-style-type: none"> • Mariadb • Realmdb
User interface may include but not limited to:	
<ul style="list-style-type: none"> • GUI 	<ul style="list-style-type: none"> • Web based

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • OHS regulations • First Aid • Network topology • Basics of database • Prototyping tools and methods 	<ul style="list-style-type: none"> • Communication • Interpersonal relationship • Team Work • Time management • Problem solving

UNIT TITLE : **Test and deploy the apps**

DESCRIPTOR : This unit covers the competencies required to carry out test and deploy the apps following standard procedures

CODE : **2519-U3-L3**

ELEMENTS OF COMPETENCE	PERFORMANCE CRITERIA
1. Test the Apps	1.1 Develop testing strategy as per the job requirement following standard procedures 1.2 Perform system and integration test as per the standard procedures 1.3 Collect reviews and feedbacks from the users and take corrective actions as per the standard procedures
2. Launch the apps	2.1 Set up hosting environment as per the job requirement following standard procedures 2.2 Deploy the apps as per the operating system following standard procedures

RANGE STATEMENT
System and integration test may include but not limited to: <ul style="list-style-type: none">• Black box testing• White box testing

UNDERPINNING KNOWLEDGE	UNDERPINNING SKILLS
<ul style="list-style-type: none"> • Ethics and Integrity • OHS regulations • First Aid • Types of testing • Testing tools • Debugging the apps 	<ul style="list-style-type: none"> • Communication • Interpersonal relationship • Team Work • Time management • Problem solving • Logical thinking

Annexure

1.1. National Competency Standards (NCS)

The National Competency Standards specify the skill, knowledge and attitudes applied to a particular occupation. Standards also specify the standards or criteria of performance of a competent worker and the various contexts in which work may take place. Standards provide explicit advice to assessors regarding the skill and knowledge to be demonstrated by candidates seeking formal recognition either following training or through work experience.

Purpose of National Competency Standards

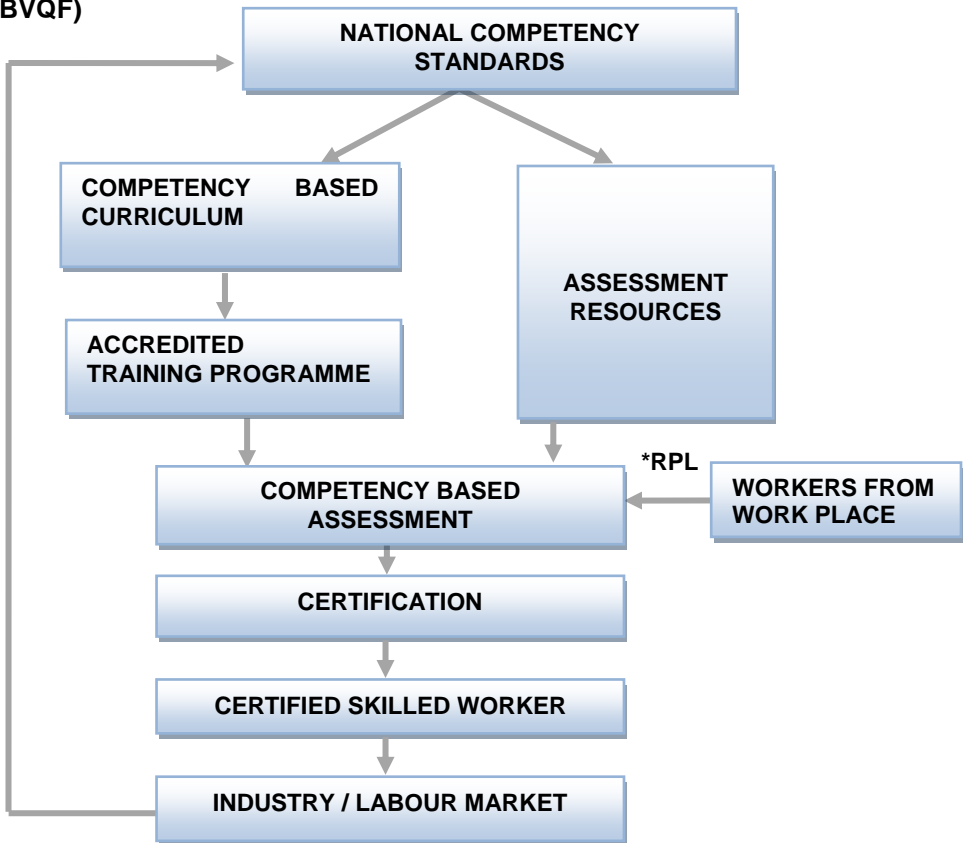
National Competency Standards serve a number of purposes including:

- Providing advice to curriculum developers about the competencies to be included in curriculum.
- Providing specifications to assessment resource developers about the competencies within an occupation to be demonstrated by candidates.
- Providing advice to industry/employers about job functions, which in turn can be used for the development of job descriptions, performance appraisal systems and work flow analysis.

1.2. Bhutan Vocational Qualifications Framework (BVQF)

Bhutan Vocational Qualifications Framework is an agreed system of Assessing, Certifying and Monitoring nationally recognized qualifications for all learning in the TVET sector against national competency standards, in training institutions, in the workplace, in schools or anywhere where learning takes place.

Components of the Bhutan Vocational Qualifications Framework (BVQF)



* RPL = Recognition of Prior Learning

BVQF Levels

The Bhutan Vocational Qualifications Framework has three levels classified based on the competency of the skilled workers. The three levels are:

- National Certificate Level 3 (NC III)
- National Certificate Level 2 (NC II)
- National Certificate Level 1 (NC I)

BVQF Level Descriptors

The qualification levels are decided based on level descriptors. The detail of the qualification level descriptor is as follows:

National Certificate Level 1 (Semi Skilled)

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none">• Are narrow in range.• Are established and familiar.• Offer a clear choice of routine responses.• Involve some prioritizing of tasks from known solutions.	<ul style="list-style-type: none">• Basic operational knowledge and skill.• Utilization of basic available information.• Known solutions to familiar problems.• Little generation of new ideas.	<ul style="list-style-type: none">• In directed activity.• Under general supervision and quality control.• With some responsibility for quantity and quality.• With no responsibility for guiding others.

National Certificate Level 2 (Craftsman)

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none"> • Require a range of well-developed skills. • Offer a significant choice of procedures requiring prioritization. • Are employed within a range of familiar context. 	<ul style="list-style-type: none"> • Some relevant theoretical knowledge. • Interpretation of available information. • Discretion and judgments. • A range of known responses to familiar problems 	<ul style="list-style-type: none"> • In directed activity with some autonomy. • Under general supervision and quality checking. • With significant responsibility for the quantity and quality of output. • With some possible responsibility for the output of others.

National Certificate Level 3 (Master craftsman)

Carry out processes that:	Learning demand:	Responsibilities which are applied:
<ul style="list-style-type: none"> • Requires a wide range of technical or scholastic skills. • Offer a considerable choice of procedures requiring prioritization to achieve optimum outcomes. • Are employed in a variety of familiar and unfamiliar contexts. 	<ul style="list-style-type: none"> • A broad knowledge base which incorporates some theoretical concepts. • Analytical interpretation of information. • Informed judgment. • A range of sometimes innovative responses to concrete but often unfamiliar problems. 	<ul style="list-style-type: none"> • In self-directed activity. • Under broad guidance and evaluation. • With complete responsibility for quantity and quality of output. • With possible responsibility for the output of others.

1.3. PURPOSE

This qualification is designed for people interested in a career as Mobile Application Developer at the Certificate level. It comprises of three units that cover the essential knowledge and skills required for people working as a Mobile Application Developer.

It provides industry specific skills and demands a level of performance that will enable new recruits to the industry to be immediately productive.

1.4. CODING USED FOR NATIONAL COMPETENCY STANDARDS

The coding and classification system developed in Bhutan is logical, easy to use, and also aligned with international best practises. The Bhutanese coding and classification system is based on the International Standard Classification of Occupations, 2008 (ISCO-08) developed by the International Labour Organisation (ILO).

The coding of the National competency standards forms the basis of the identification code for the Vocational Education and Training Management Information System (VET – MIS) both in terms of economic sector identification and that of the individual standard.

Coding the individual national competency standards

Coding the individual skills standard has a multiple purpose:

- to identify the level,
- to identify to which module the standard belongs,
- to identify in which order the standard is clustered within that module.

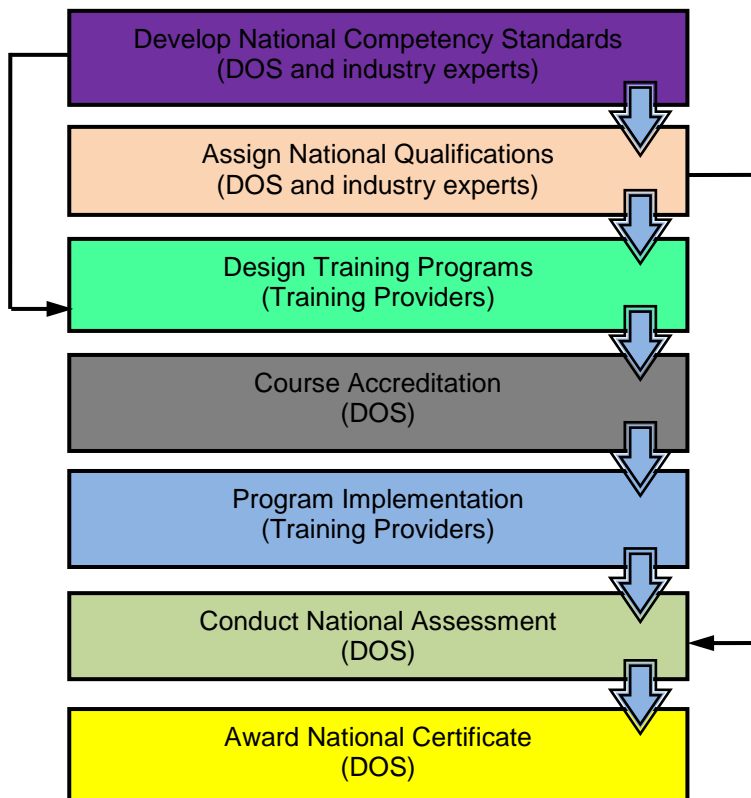
A job can include a number of competencies described in the national competency standards.

However, in order to follow a logical order, only national competency standards related to each other and following a logical sequence in terms of training delivery, from the simple to the complex, are clustered into a module. Some standards are so complex that they need to stand alone.

To illustrate with an example, the ILO assigns the code 2519 to the occupation of Mobile Apps developers and related trades. Therefore, in the

Bhutan's context, the occupation Mobile Apps developer has been assigned the code 2519 in the National Coding System. The first unit is assigned the code U1. Levels are assigned the code L and follow a logical progression from the National Certificate Level 1 (NC I) to the National Certificate Level 3 (NC III). Therefore the National Certificate Level 1 is assigned the code L1.

Implementation and operational procedures for National Competency Standards (NCS)



1.5 ASSESSMENT GUIDE

Form of assessment

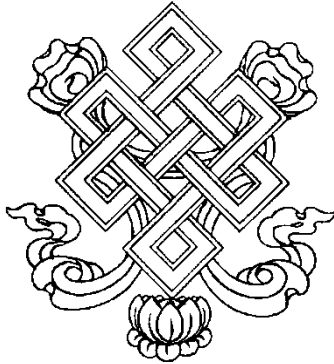
- Continuous assessment together with collected evidence of performance will be used.
- Evidence of the performance shall be based on practical demonstration.
- Knowledge can be assessed through written form of assessment.

Assessment context

- Competency may be assessed in the actual work place or in a simulated workplace setting.

Assessment condition

- The candidate shall have access to all required tools, equipment, materials and documents.
- The candidate must complete the assessment in an accepted time frame



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