

CONTACT DETAILS OF THE BODY SUBMITTING THE QUALIFICATION FILE

Name and address of submitting body:

IT-ITeS Sector Skills Council NASSCOM (SSC NASSCOM)
Plot No. – 7, 8, 9 & 10
Sector – 126, Noida
Uttar Pradesh - 201303

Name and contact details of individual dealing with the submission

Name: Ms Divya Gupta

Position in the organisation: Solutions & Partner Ecosystem lead

Address if different from above: Same as above

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List of documents submitted in support of the Qualifications File

1. Functional Analysis Document
2. Occupational Analysis Document
3. Qualification Pack
4. Occupational Map
5. Model Curriculum
6. Summary Sheet
7. Industry Validations

NSQF QUALIFICATION FILE**Approved in 23rd NSQC, Dated: 22nd August, 2019****SUMMARY**

1	Qualification Title	IoT – Control Room Operator
2	Qualification Code, if any	SSC/Q8209
3	NCO code and occupation	NCO-2015/ 2521.0100
4	Nature and purpose of the qualification (Please specify whether qualification is short term or long term)	<ul style="list-style-type: none">- This is a Qualification Pack (QP) containing National Occupational Standards for the job role “IoT – Control Room Operator”- The purpose of the qualification is to help individuals at this job perform the support of command control centre operations and oversee the day to day activities of IoT solutions. The qualification will also provide them with the appropriate problem-solving ability, help them be better organized and have good attention to detail.
5	Body/bodies which will award the qualification	SSC NASSCOM
6	Body which will accredit providers to offer courses leading to the qualification	IT-ITeS SSC Presently, Accreditation is not prescribed; affiliation is one of the models.
7	Whether accreditation/affiliation norms are already in place or not, if applicable (if yes, attach a copy)	Yes. SMART norms for accreditation and SSC norms are available for affiliation on SMART portals
8	Occupation(s) to which the qualification gives access	Internet of Things
9	Job description of the occupation	Individuals at this job are responsible for ensuring regular software and firmware updates for devices. They will be responsible for monitoring working environment and making sure it meets requirements for health, safety and security. They will need to inculcate strong work ethic, maintain a healthy working environment and provide data and information in standard formats.
10	Licensing requirements	NA
11	Statutory and Regulatory requirement of the relevant sector (documentary evidence to be	Though some standards for cyber security exist, currently no standards specific to Statutory and Regulatory exist for Internet of

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	provided)	Things.	
12	Level of the qualification in the NSQF	5	
13	Anticipated volume of training/learning required to complete the qualification	310 hours (110 hours theory, 200 hours practical)	
14	Indicative list of training tools required to deliver this qualification	<ul style="list-style-type: none">• Whiteboard and Markers• LCD Projector and Laptop for presentations• Lab equipped with the following: -• PCs/Laptops• Internet with Wi-Fi (Min 2 Mbps Dedicated)• Chart paper and sketch pens• Latest version of statistical software packages and IDEs• Chart paper, markers, picture magazines and old newspapers	
15	Entry requirements and/or recommendations and minimum age	Graduate in any discipline preferably Science/Computer Science/Electronics and Engineering /Information Technology who is at least 18 years of age	
16	Progression from the qualification (Please show Professional and academic progression)	This entry should refer to one or more of the following: - access to other qualifications at the same NSQF level – IoT Hardware Analyst	
17	Arrangements for the Recognition of Prior learning (RPL)	- Response to market forces for RPL. - RPL assessments will be the same as our normal assessments.	
18	International comparability where known (research evidence to be provided)	Not Yet Established	
19	Date of planned review of the qualification.	11 th March 2020	
20	Formal structure of the qualification		
	Mandatory components		
	Title of component and identification code/NOSs/Learning outcomes	Estimated size (learning hours)	Level

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(i)	Bridge Modules	29	-
(ii)	SSC/N8235 (Manage IoT devices and ensure regular software and firmware updates)	78	7
(iii)	SSC/N8236 (Support command control centre operations and oversee day-to-day activities of IoT solutions)	78	6
(iv)	SSC/N8238 (Create technical documents and manuals)	25	6
(v)	SSC/N9003 (Maintain a healthy, safe and secure working environment)	25	6
(vi)	SSC/N9004 (Provide data/information in standard formats)	50	6
(vii)	SSC/N9013 (Inculcate strong work ethic in line with organizational code of conduct)	25	6
	Total	310	

SECTION 1**ASSESSMENT**

21	Body/Bodies which will carry out assessment: SSC NASSCOM will carry out the assessment along with the assessment partners.
22	How will RPL assessment be managed and who will carry it out? <ul style="list-style-type: none">• <i>RPL assessment will be online, objective evaluation in a highly secure and proctored environment.</i>• <i>RPL assessments will be the same as our normal assessments.</i>• <i>All procedures followed will be similar to the normal assessment methodology.</i>• <i>Issuance of the qualification will be through the centralise SDMS (NSDC).</i>• <i>Quality assurance – By equating performance amongst the multiple affiliated assessment provider (AAP) and periodic analytical review and sensitivity analysis for the reliability and validity of all aspects of assessments.</i>
23	Describe the overall assessment strategy and specific arrangements which have been put in place to ensure that assessment is always valid, reliable and fair and show that these are in line with the requirements of the NSQF. <ul style="list-style-type: none">• <i>SSC NASSCOM carries out online assessments through very robust platforms and proctoring methodology.</i>• <i>Conduct of assessment are through trained and certified proctors under the assessment agency, partnering with SSC NASSCOM</i>• <i>AAP affiliated to SSC NASSCOM come with strong industry references and long experience and analytical ability in assessment methodologies.</i>• <i>Periodic workshops are held with the vendors to bring them to a common understanding of the job role, its NSQF level, difficulty level as well as format and sample of assessment items.</i>• <i>Internal moderations further ensure the validity and reliability of the assessments and consistency of difficulty levels of the test questions across AAPs.</i>• <i>AAPs work with hirers on similar job roles, they use SMEs from their network to get industry relevant scenarios and assessment items aligned to the expected outcomes of the job role/QP.</i>• <i>Curriculum and real time scenarios facilitate further understanding the scope of the QP with reference to process knowledge and skills.</i>• <i>In addition, we conduct workshops with AAPs w.r.t. beta testing, review of the assessment analytics, performance of the test platform, moderation of NSQF levels, deployment and invigilation patterns and</i>

	<p><i>infrastructure requirements including malpractice avoidance.</i></p> <ul style="list-style-type: none"><i>• Inferences from benchmarking and analytics patterns are taken into consideration in the development and revision of the assessment criteria and format of assessment items.</i><i>• Reliability and validity of assessment items is standardised among AAPs.</i><i>• Difficulty level of test items with reference to NSQF levels are ensured, so that the outcomes with reference to performance criteria of the constituent NOSs are in line with the NSQF level descriptors. This is achieved through the detailed test matrix design.</i>
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Please attach most relevant and recent documents giving further information about assessment and/or RPL.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

ASSESSMENT EVIDENCE

Complete a grid for each component as listed in “Formal structure of the the qualification” in the Summary.

NOTE: this grid can be replaced by any part of the qualification documentation which shows the same information – ie Learning Outcomes to be assessed, assessment criteria and the means of assessment.

24. Assessment evidences**Title of Component:**

<u>Job Role</u>	<u>IoT – Control Room Operator</u>
<u>Qualification Pack</u>	<u>SSC/Q8209</u>
<u>Sector Skill Council</u>	<u>IT-ITeS</u>

Guidelines for Assessment:

1. Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC.
2. The assessment for the theory part will be based on knowledge bank of questions created by the SSC.
3. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS.
4. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below).
5. Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion.
6. To pass a QP, a trainee should score an average of 70% across generic NOS' and a minimum of 70% for each technical NOS.
7. In case of *unsuccessful completion*, the trainee may seek reassessment on the Qualification Pack.

Title of NOS/Unit/Component:

Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
1. SSC/N8235 Manage IoT devices and ensure regular software and firmware updates	PC1. Perform timely installation of patches and updates of solution software and firmware	100	15	4.5	10.5
	PC2. Perform over-the-air updates of devices		15	4.5	10.5
	PC3. Initialize files and tools required for Over the Air update process		10	3	7

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	PC4. Perform encryption of files to secure Over the Air update process		5	1.5	3.5
	PC5. Distribute files to intended target devices		15	4.5	10.5
	PC6. Perform the update process for target devices		15	4.5	10.5
	PC7. Perform post-update activities such as activating updated code		10	3	7
	PC8. Verification that system is functioning as per specifications		15	4.5	10.5
	Total		100	30	70
2. SSC/N8236 Support command control centre operations and oversee day-to-day activities of IoT solutions	PC1. Interface all physical devices with central command centre	100	15	4.5	10.5
	PC2. Monitor unauthorized access attempts to IoT devices, customer data, and backend systems		15	4.5	10.5
	PC3. Monitor security breaches from external threats		5	1.5	3.5
	PC4. Manage controls for device and user		5	1.5	3.5

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	authentication and fraud detection				
	PC5. Continuously monitor device usage and performance		15	4.5	10.5
	PC6. Detect and respond to unusual device behaviour in near real-time		5	1.5	3.5
	PC7. Report abnormal behaviour to relevant stakeholders		5	1.5	3.5
	PC8. Perform remote diagnosis of IoT assets using technologies such as AR/VR		5	1.5	3.5
	PC9. Perform remote repair of IoT assets using technologies such as AR/VR		5	1.5	3.5
	PC10. Manage event and ticket management related activities		10	3	7
	PC11. Ensure round the clock service reliability		5	1.5	3.5
	PC12. Prepare reports based on data and insights generated		5	1.5	3.5

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	PC13. Share reports and insights with relevant stakeholders		5	1.5	3.5
	Total		100	30	70
3. SSC/N8238 Create technical documents and manuals	PC1. Identify the purpose and the scope of the activity for which technical documentation is to be produced	100	20	6	14
	PC2. Obtain information for the technical document from relevant sources and stakeholders		15	4.5	10.5
	PC3. Draft technical document ensuring that content is concise, complete and easy to consume		15	4.5	10.5
	PC4. Review technical document content with relevant stakeholders and document owners		10	3	7
	PC5. Ensure that technical document is formatted and designed as per specifications		10	3	7
	PC6. Transfer technical document to relevant stakeholders for		10	3	7

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	sign-off and publishing				
	PC7. Continuously review and update technical document		20	6	14
	Total		100	30	70
4. SSC/N9003 Maintain a healthy, safe and secure working environment	PC1. Comply with your organization's current health, safety and security policies and procedures	100	20	10	10
	PC2. Report any identified breaches in health, safety, and security policies and procedures to the designated person		10	0	10
	PC3. Identify and correct any hazards that you can deal with safely, competently and within the limits of your authority		20	10	10
	PC4. Report any hazards that you are not competent to deal with to the relevant person in line with organizational procedures and warn other people who may be affected		10	0	10
	PC5. Follow your organization's		20	10	10

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	emergency procedures promptly, calmly, and efficiently				
	PC6. Identify and recommend opportunities for improving health, safety, and security to the designated person		10	0	10
	PC7. Complete any health and safety records legibly and accurately		10	0	10
	Total		100	30	70
5. SSC/N9004 Provide data/information in standard formats	PC1. Establish and agree with appropriate people the data/information you need to provide, the formats in which you need to provide it, and when you need to provide it	100	12.5	12.5	0
	PC2. Obtain the data/information from reliable sources		12.5	0	12.5
	PC3. Check that the data/information is accurate, complete and up-to-date		12.5	6.25	6.25
	PC4. Obtain advice or guidance from appropriate people where there are		6.25	0	6.25

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	problems with the data/information				
	PC5. Carry out rule-based analysis of the data/information, if required		25	0	25
	PC6. Insert the data/information into the agreed formats		12.5	0	12.5
	PC7. Check the accuracy of your work, involving colleagues where required		6.25	0	6.25
	PC8. Report any unresolved anomalies in the data/information to appropriate people		6.25	6.25	0
	PC9. Provide complete, accurate and up-to-date data/information to the appropriate people in the required formats on time		6.25	0	6.25
	Total		100	25	75
6. SSC/N9013 Inculcate strong work ethic in line with organizational code of conduct	PC1. Treat your colleagues with respect	100	1	0.3	0.7
	PC2. Work in line with your company's guidelines and policies		1	0.3	0.7

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	PC3. Follow dress code as defined by the organization		1	0.3	0.7
	PC4. Do not disclose company's confidential data outside the organization		10	3	7
	PC5. Be sensitive and respectful to other cultures in your workspace		10	3	7
	PC6. Refrain from using your position in the organization to gain personal benefits		1	0.3	0.7
	PC7. Utilize company's resources efficiently		10	3	7
	PC8. Refrain from getting into a conflict of interest scenario		1	0.3	0.7
	PC9. Adopt meritocratic approaches towards work and refrain from nepotism or favouritism		5	1.5	3.5
	PC10. Treat fellow colleagues equally		10	3	7
	PC11. Keep your immediate area clean and tidy		1	0.3	0.7
	PC12. Utilise your		10	3	7

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	time efficiently				
	PC13. Take ownership for the activities assigned to you		10	3	7
	PC14. Adapt to changes in work plans and be flexible without compromising on delivery quality		5	1.5	3.5
	PC15. Assess the broader picture while performing the activities assigned to you		1	0.3	0.7
	PC16. Meet deadlines without giving up quality		5	1.5	3.5
	PC17. Consistently report on time to work		5	1.5	3.5
	PC18. Analyse and review your work on a regular basis to increase your performance		1	0.3	0.7
	PC19. Be cooperative with other employees		10	3	7
	PC20. Prudently take risks where required		1	0.3	0.7
	PC21. Have an open mindset to new		1	0.3	0.7

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Assessment outcomes	Assessment Criteria for outcomes	Total Marks	Out Of	Theory	Skills Practical
	ideas from others				
	Total		100	30	70

Outcomes to be assessed/NOSs to be assessed	Assessment criteria for the outcome
Means of assessment 1 <i>Proctored online assessments (LAN and Web based), carried out using a variety of question formats applicable for linear / adaptive methodologies; performance criteria being assessed via situation judgement tests, simulations, code writing, psychometrics and multiple-choice questions etc.</i>	
Means of assessment 2 NA	
Pass/Fail <ol style="list-style-type: none"> Criteria for assessment for each Qualification Pack will be created by the Sector Skill Council. Each Performance Criteria (PC) will be assigned marks proportional to its importance in NOS. SSC will also lay down proportion of marks for Theory and Skills Practical for each PC. The assessment for the theory part will be based on knowledge bank of questions created by the SSC. Assessment will be conducted for all compulsory NOS, and where applicable, on the selected elective/option NOS/set of NOS. Individual assessment agencies will create unique question papers for theory part for each candidate at each examination/training centre (as per assessment criteria below). Individual assessment agencies will create unique evaluations for skill practical for every student at each examination/training centre based on this criterion. To pass a QP, a trainee should score an average of 70% across generic NOS' and a minimum of 70% for each technical NOS. In case of <i>unsuccessful completion</i>, the trainee may seek reassessment on the Qualification Pack. 	

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Title/Name of qualification/component: IoT – Control Room Operator			Level: 5
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
Process	<p>Job that requires well developed skill, with clear choice of procedures in familiar context.</p> <ul style="list-style-type: none">• Perform physical installation and configuration of networks and devices• Adopt prescribed physical security measures while installing and configuring networks and devices• Authenticate, provision, configure, monitor and maintain the device firmware and software that provides its functional capabilities• Establish and maintain the health, connectivity, and security of IoT devices• Ensure comprehensive device management for IoT solutions	<p>The individual in this role must work in a constantly changing environment where he/she needs to work well under pressure, and who adjusts quickly to change.</p> <p>To perform his/her role effectively, the individual needs to be a good analytical thinker, gather data, and determine how best to commission and monitor IoT devices. He/she needs to remain flexible and productive in times of continuing change and high stress.</p>	5
Professional knowledge	<p>Knowledge of facts, principles, processes and general concepts, in a field of work or study.</p>	<p>The individual in the role must creative problem solver and a leader.</p> <p>To install patches and updates to solution</p>	5

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Title/Name of qualification/component: IoT – Control Room Operator			Level: 5
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
	<ul style="list-style-type: none"> How to commission and decommission devices How to manage the inventory of IoT assets (including network and device components) How to perform remote repair services How to ensure physical security of IoT assets 	software and firmware, the individual in the role needs to have broad knowledge of the overall IoT solution and how the components interact with each other	
Professional skill	<p>A range of cognitive and practical skills required to accomplish tasks and solve problems by selecting and applying basic methods, tools, materials and information.</p> <ul style="list-style-type: none"> Perform timely installation of patches and updates of solution software and firmware Perform over-the-air updates of devices Perform post-update activities such as activating updated code Monitor unauthorized access attempts to IoT devices, customer data, and backend systems 	The role demands a skillset that allows the individual to oversee day-to-day activities of IoT devices. To do so, the individual needs to have prior experience in a related field and must have the attention to detail skills to put these skills in practice.	5
Core skill	Desired mathematical skill; understanding	The individual should possess in depth	5

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Title/Name of qualification/component: IoT – Control Room Operator			Level: 5
NSQF Domain	Key requirements of the job role	How the job role relates to the NSQF level descriptors	NSQF Level
	<p>of social, political; and some skill of collecting and organising information, communication.</p> <ul style="list-style-type: none"> Continuously monitor device usage and performance and collect relevant data Detect and respond to unusual device behaviour based on near real-time data Trigger device action, monitor meta data, or stream and process incoming and outgoing data 	<p>knowledge of aspects such as security monitoring, remote diagnosis and repair and round the clock support services. Apart from the ability to use these tools, the individual needs to be efficient in device interfacing, security monitoring, anomaly detection, remote diagnosis and repair, service reliability and generation of relevant reports.</p>	
Responsibility	<p>Responsibility for own work and learning and some responsibility for others' works and learning.</p> <ul style="list-style-type: none"> Manage teams working in Command Control Centres Present actionable information to the right person, and at the right time Lead to results in performance improvements, when personnel take corrective action 	<p>The role demands working in a team to support command control centre operations and oversee day-to-day activities of IoT solutions. This may involve helping peers with their work from time to time and providing feedback and advice to help improve the quality of their work. Since this role is likely to have people reporting to it, the individual performing this role is supposed to take responsibility for the output and the development of the entire team.</p>	5

SECTION 3

EVIDENCE OF NEED

26	<p>What evidence is there that the qualification is needed? What is the estimated uptake of this qualification and what is the basis of this estimate?</p> <p>It is estimated that 15 billion devices are already connected to the Internet. By 2020, that figure will rise to over 50 billion. As the number of IoT devices and solutions rises, there will be a greater need for authenticating, provisioning, configuring, monitoring and maintaining the device firmware and software that provides its functional capabilities. This would have to be done by a professional working in a central control room from where remote connections can be established to IoT devices. The professional would also be required to monitor devices, sensors and gateways at scale at an ongoing basis. He/she would also need perform tasks such as onboarding devices and pushing software updates and patches to them. Effective device management is critical to maintaining the health, security and connectivity of IoT devices at scale and for this, there is a need for professionals who can perform such activities.</p> <p>https://www.networkworld.com/article/3258812/the-future-of-iot-device-management.html</p>
27	<p>Recommendation from the concerned Line Ministry of the Government/Regulatory Body. To be supported by documentary evidences</p> <p>In place. MeitY has approved all the 9 QPs w.r.t. Internet of Things. Currently, there are no regulations on Internet of Things by the government or any other industrial body. However, NASSCOM is working with NITI Aayog to build national policies.</p>
28	<p>What steps were taken to ensure that the qualification(s) does (do) not duplicate already existing or planned qualifications in the NSQF? Give justification for presenting a duplicate qualification</p> <p><i>Cleared by QRC at NSDC. There is only no other qualification in the NQR with respect to the Internet of Things, which is – ‘IoT – Control Room Operator.’ This is a specific role that is responsible for performing different aspects of data quality management.</i></p>
29	<p>What arrangements are in place to monitor and review the qualification(s)? What data will be used and at what point will the qualification(s) be revised or updated? Specify the review process here</p>

- *Monitoring and review of the qualifications is a project executed every two years.*
- *While adoption by industry and academia is one good indicator for the usefulness of a qualification pack, we adopt multiple approaches for periodic review and maintenance of the qualifications.*
 1. *Sub-sector wise Industry council, headed by council chair is a formal part of our governing structure. The council participates and steers the qualifications creation and upkeep. This council is a body elected by over 1800 member companies of NASSCOM.*
 2. *Special interest groups are formed for a more focused and detailed review of the qualifications in the light of emerging knowledge and skill areas.*
 3. *Events and workshops are conducted periodically to validate, monitor and review the qualification.*
 4. *As a part of due diligence process for affiliating Training providers, we do ask them for validation from their hirers – thus covering even medium, small and micro segment of the hiring companies.*
 5. *Any institution / individual is welcome to send feedback, which is recorded and considered during next review cycle.*

The above data is used to update the Qualification and this revision is published annually. Nonetheless, if a major feedback is received prior to the planned review period, the change is considered in consultation with the industry council.

Please attach most relevant and recent documents giving further information about any of the topics above.

Give the titles and other relevant details of the document(s) here. Include page references showing where to find the relevant information.

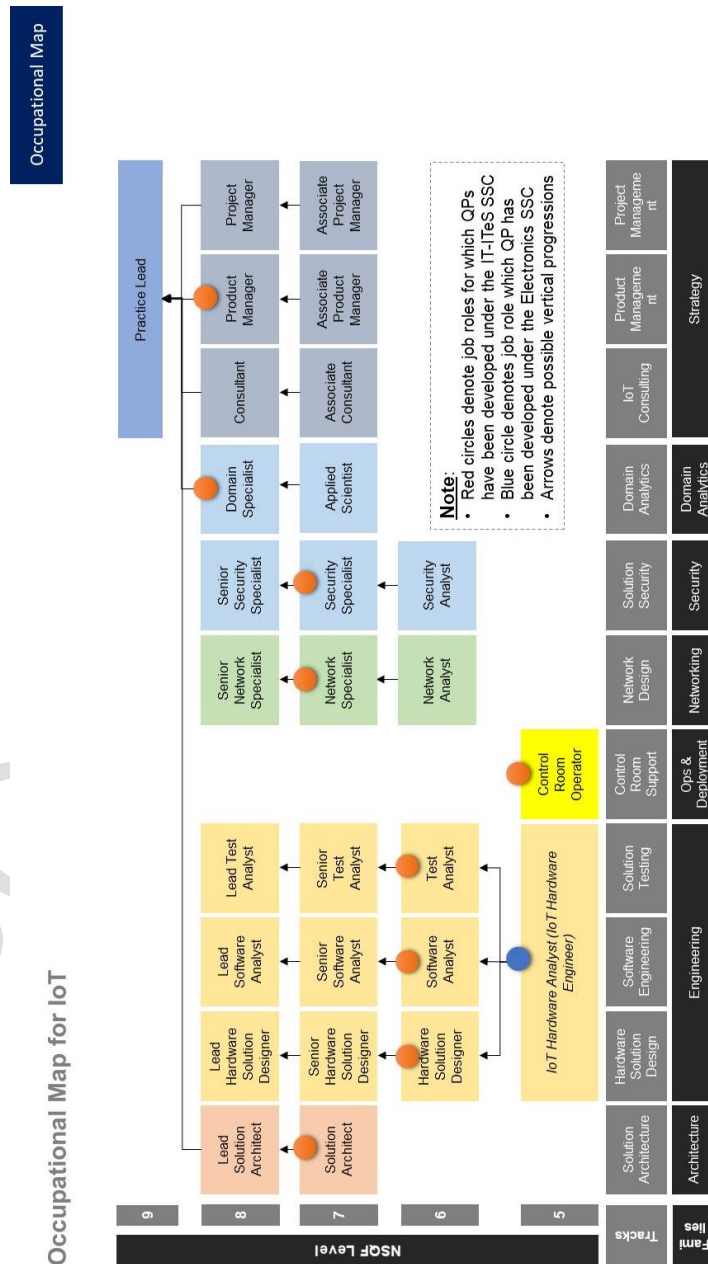
- NASSCOM Talent Demand and Supply Report – Internet of Things

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SECTION 4
EVIDENCE OF PROGRESSION

30

What steps have been taken in the design of this or other qualifications to ensure that there is a clear path to other qualifications in this sector?
Show the career map here to reflect the clear progression



The Career /Occupational Map reflects horizontal and vertical mobility emanating from 'Job Families' and 'Tracks' across NSQF and experience levels .

NSQF QUALIFICATION FILE

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	Presently 9 of the most popular job roles/ QPs in this Internet of Things Occupation have been articulated as per IT-ITeS industry's direction and aspirations.
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