



# HAF601 Licensing Process of NicSys®8000N

Wanwan Shen  
CNCS

9th International Workshop on Application of FPGA in Nuclear Power Plants  
October 3-6, 2016, Lyon, France



# About CNCS



**DCS Series**

**Nuclear specific  
I&C systems**



**Nuclear  
Detectors**

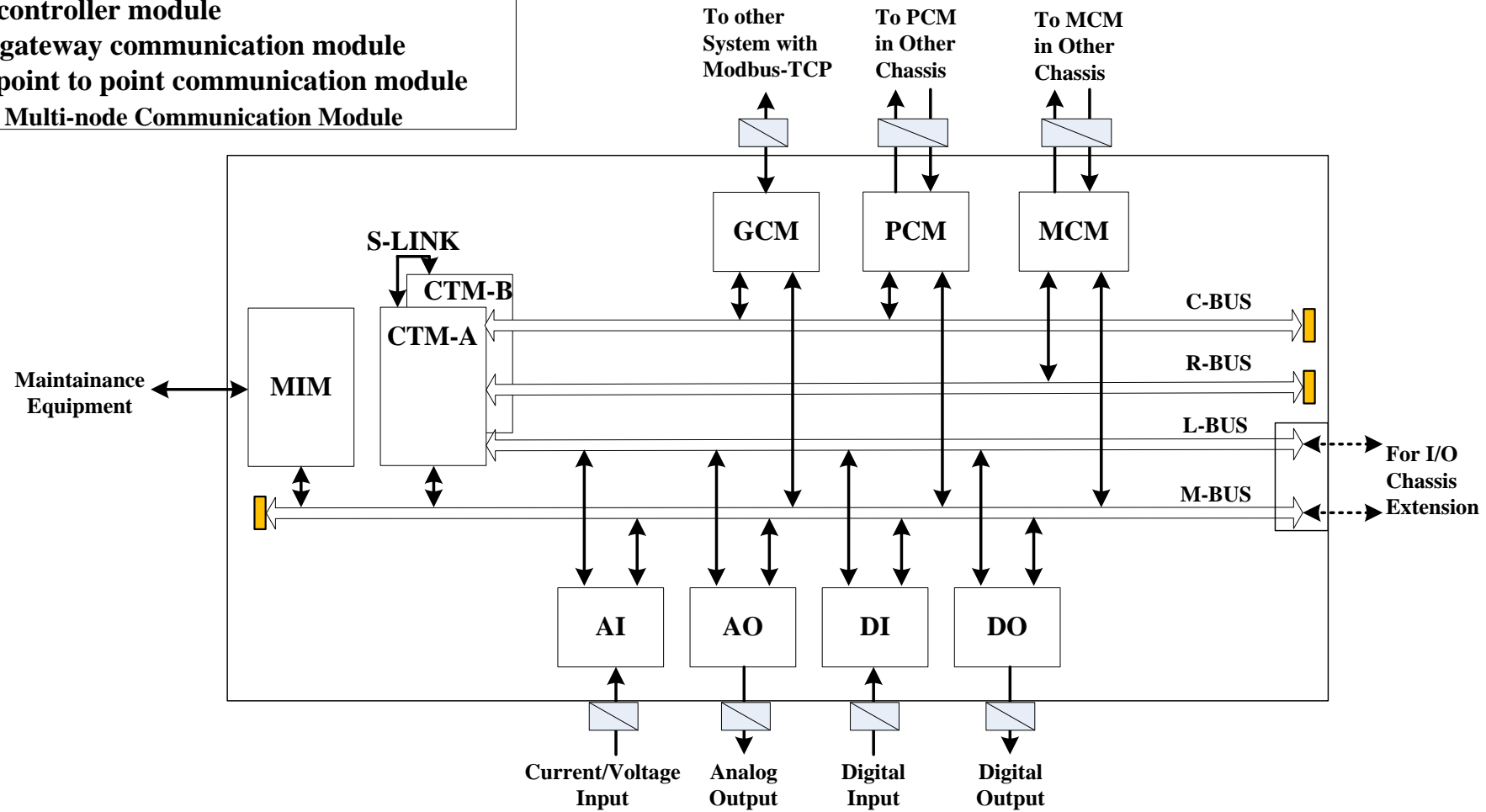


**Nuclear  
Instruments**



# About NicSys® 8000N Platform

**MIM: maintenance module**  
**CTM: controller module**  
**GCM: gateway communication module**  
**PCM: point to point communication module**  
**MCM: Multi-node Communication Module**



**Licensing from China's National Nuclear Safety Administration (NNSA) is required by HAF601 for nuclear safety-related equipment vender whom design and manufacture in china.**



**1** HAF601 License Introduction

**2** HAF601 Licensing Process of NicSys<sup>®</sup>8000N

**3** Compare HAF601 and NRC License



# HAF601 License Introduction



# HAF601 License Introduction

## HAF601

Code on supervision and management of design, manufacturing, installation and non-destructive testing of civil nuclear safety equipment.

## HAF603

Code on supervision and management of welder and welding operator qualification of civil nuclear safety equipment.



## HAF602

Code on supervision and management of non-destructive testing personnel qualification of civil nuclear safety equipment.

## HAF604

Code on supervision and management of the imported civil nuclear safety equipment.



# License for Design and Manufacture



License for Design



License for Manufacturing





# Conditions

- Business license
- Legal person

- More than 5 years nuclear related project experience

- Professionals
- Qualifications

**Legal Person**

**Workplace Facilities and Equipment**

**Work Achievements**

**Quality Assurance System**

**Technology professionals**

**Prototype**

- Workplace
- Facilities
- Tools & equipment

- Management system
- QA system in conformity with HAF003

- Type of equipment
- Classification
- Phase
- Manufacturing technique
- Material
- System Structure



# Civil Nuclear Safety Equipment Type

## Machinery Equipment

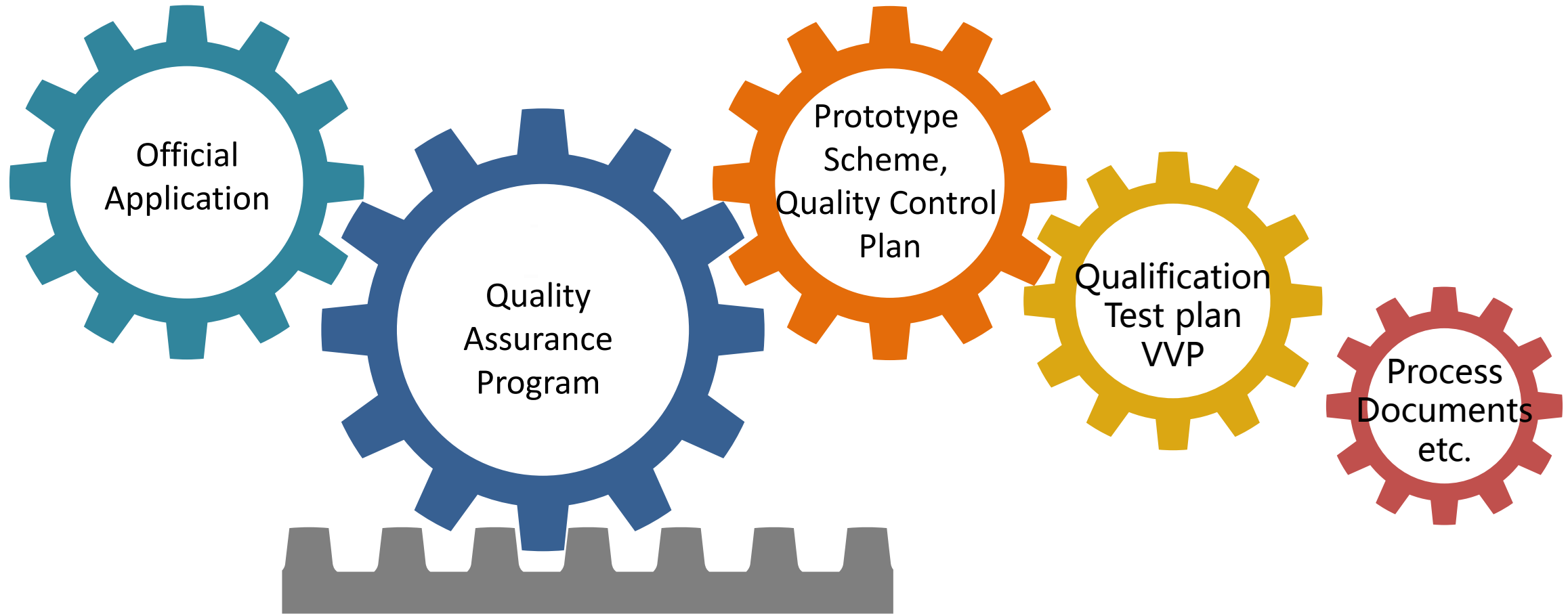
- 1 Steel Containment ;
- 2 Containment Steel Liner ;
- 3 Pressure Vessel 、
- 4 Tanks
- 5 Heat Exchangers 、
- 6 Pipe and Pipe Fittings 、
- 7 Pumps 、
- 8 Core Structure 、
- 9 Control Rod Driver Mechanism 、
- 10 Fan 、
- 11 Compressor 、
- 12 Valve 、
- 13 Bearing Parts 、
- 14 Valve/bellows Expansion Joint 、
- 15 Gate 、
- 16 Mechanical Penetrations 、
- 17 Flange 、
- 18 Castings and Forgings

## Electrical Equipment

- 1 Sensor ;
- 2 Cables ;
- 3 Electrical penetration assemblies 、
- 4 Instrument & control system cabinet ;**
- 5 Power equipment 、
- 6 Valve Driver Device ;
- 7 Motor ;
- 8 Transformer ;
- 9 Sets of Switch Equipment and Control Equipment

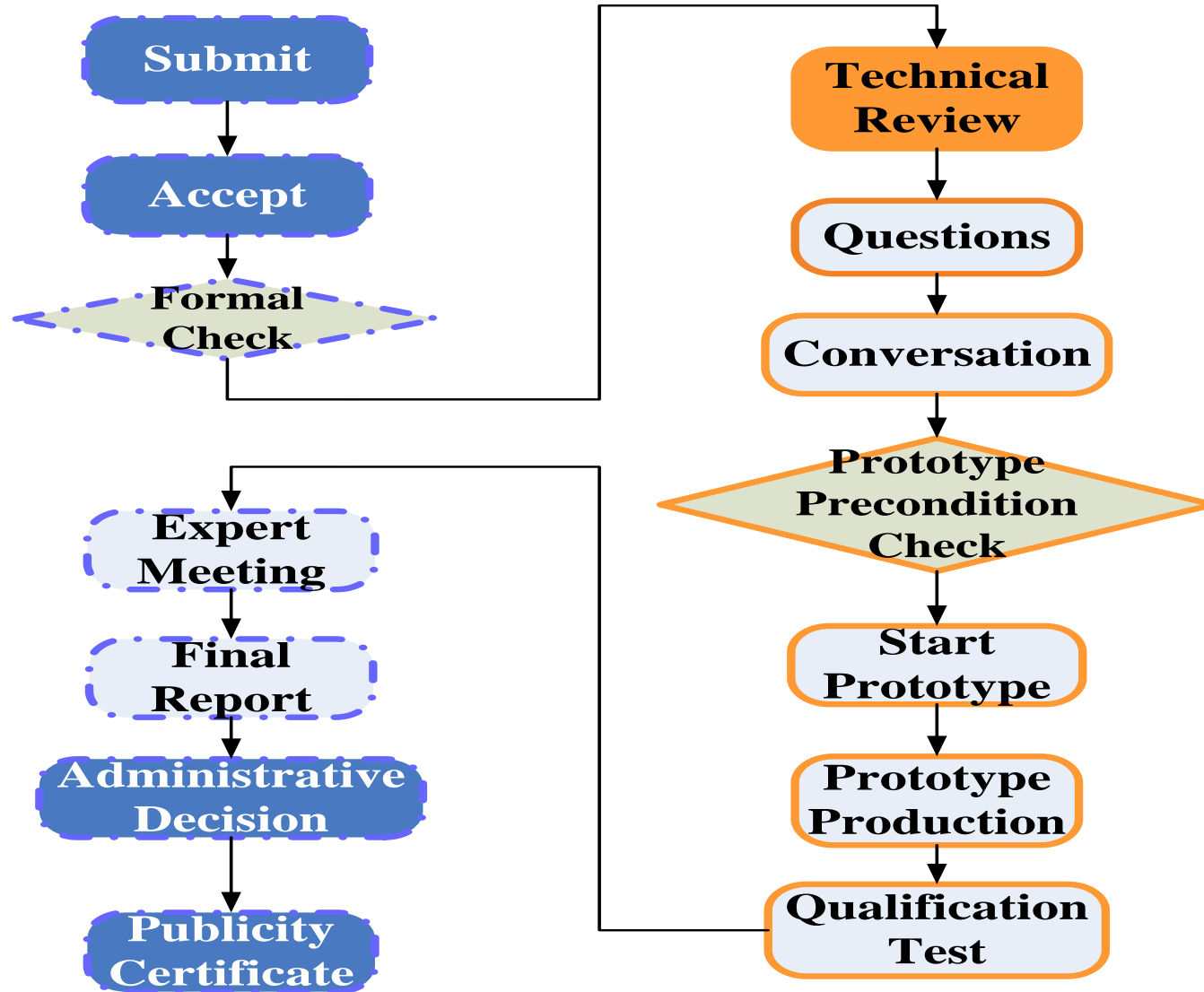


# Application Documents



# HAF601 Licensing Process

NNSA



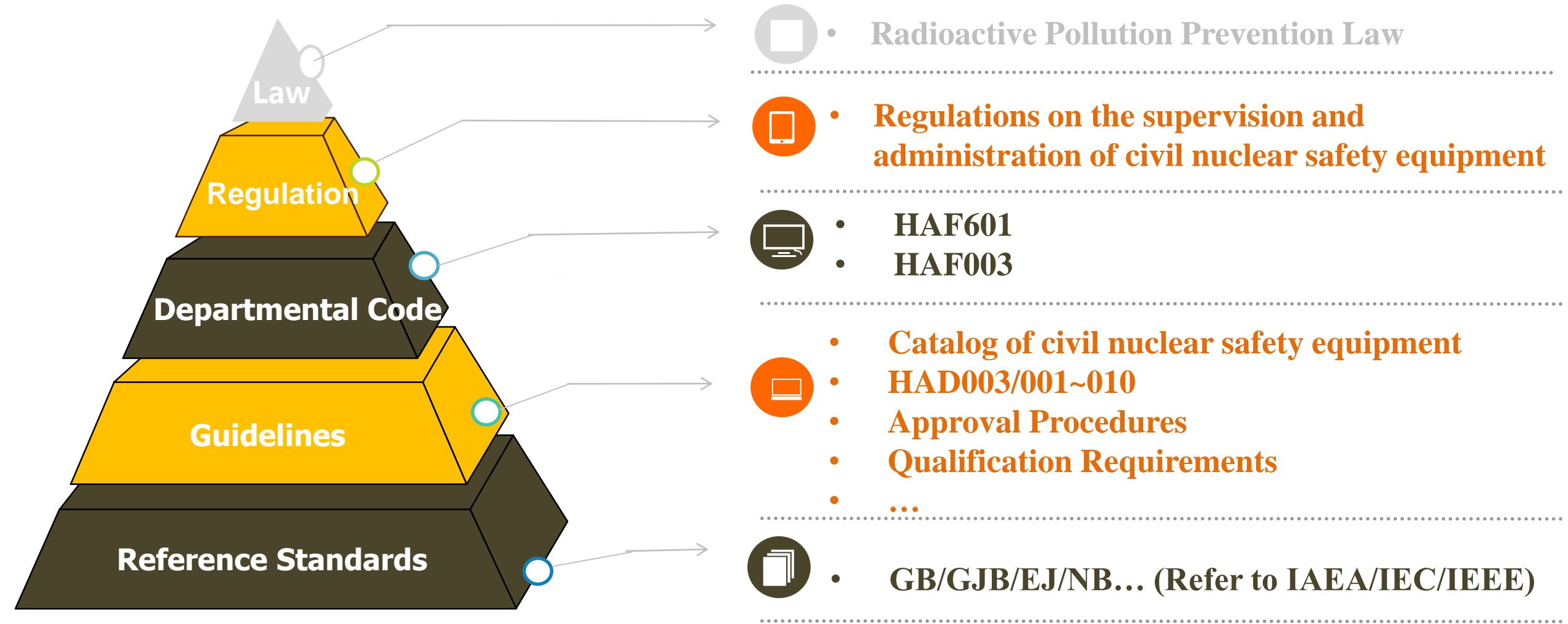
Technology  
Support  
Organization





# NicSys<sup>®</sup>8000N's HAF601 Licensing Process





## Legal Person

CNCS meet the legal conditions of enterprise

## Work Achievements

- More than five years.

## Quality Assurance

- HAF003

## Facilities Equipment

- Manufacturing Site
- Integration Site
- Production Equipment
- Design Verification/Analysis Software
- Measure Instruments



## Technical Capacity

- Refer to IAEA/IEC/IEEE Standard
- FPGA Development Technology and Solution
- TUV Certified V&V

## Prototype

- Appropriate Scale
- Materials, Structure and Design Parameter

## Professional

- Developer
- QA
- Manufacturer
- V&V





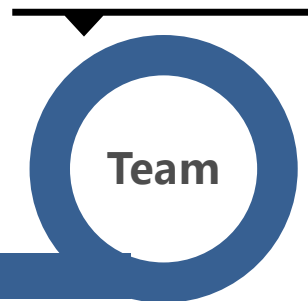
## Scope of the activity in NicSys®8000N’s HAF601 design/manufacture license

Eqpt. Class	Eqpt. Type	Nuclear Safety Level	Design/ Manufacture Capability	Typical Eqpt. Name	Scope of Design/Manufacture Activities	Workplace
Cabinets	<ul style="list-style-type: none"> <li>Cabinets</li> <li>Racks</li> </ul>	1E	<ul style="list-style-type: none"> <li>Anti-seismic: I</li> <li>Environment: Outside of Containment</li> </ul>	Nuclear Safety DCS Cabinets	<ul style="list-style-type: none"> <li>Requirement</li> <li>Design</li> <li>Implementation</li> <li>Integration</li> <li>Prototype</li> <li>EQ</li> <li>Test</li> </ul>	<ul style="list-style-type: none"> <li>Development site</li> <li>Integration site</li> <li>Manufacturing site</li> </ul>





## 1 Organizational Structure and Responsibility



## 2 QA Program



## 3 QA Procedure

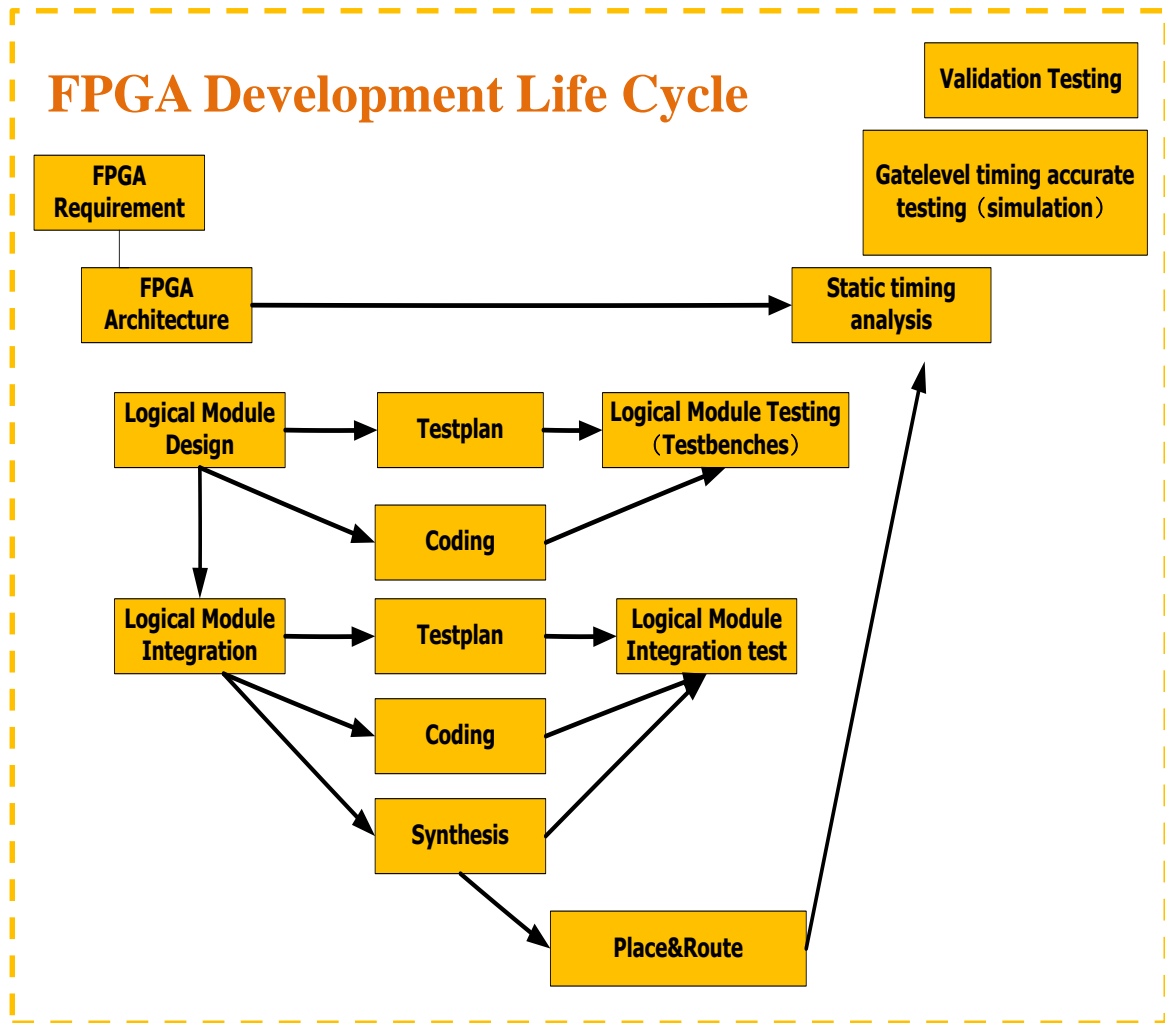
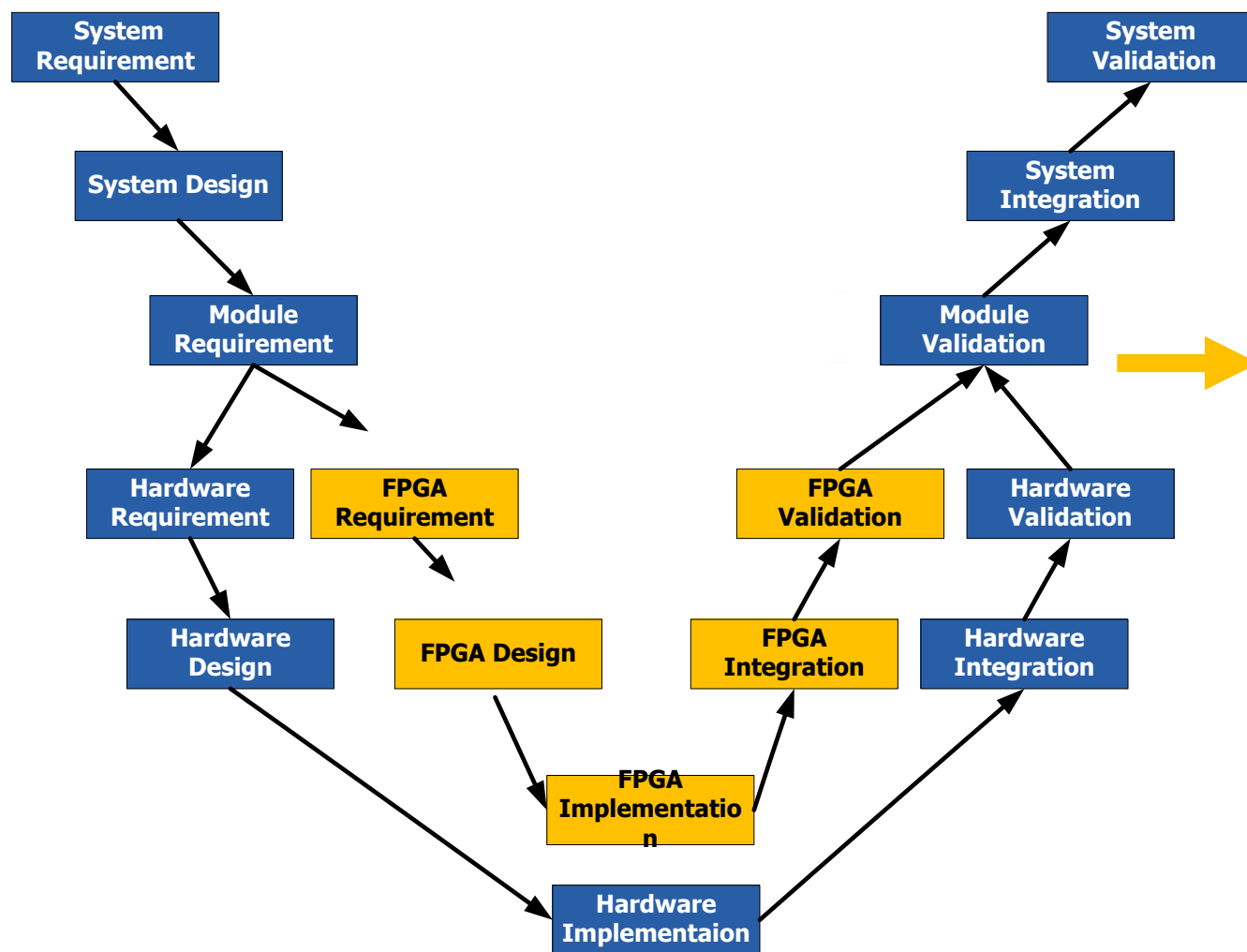


## 4 Work Instructions



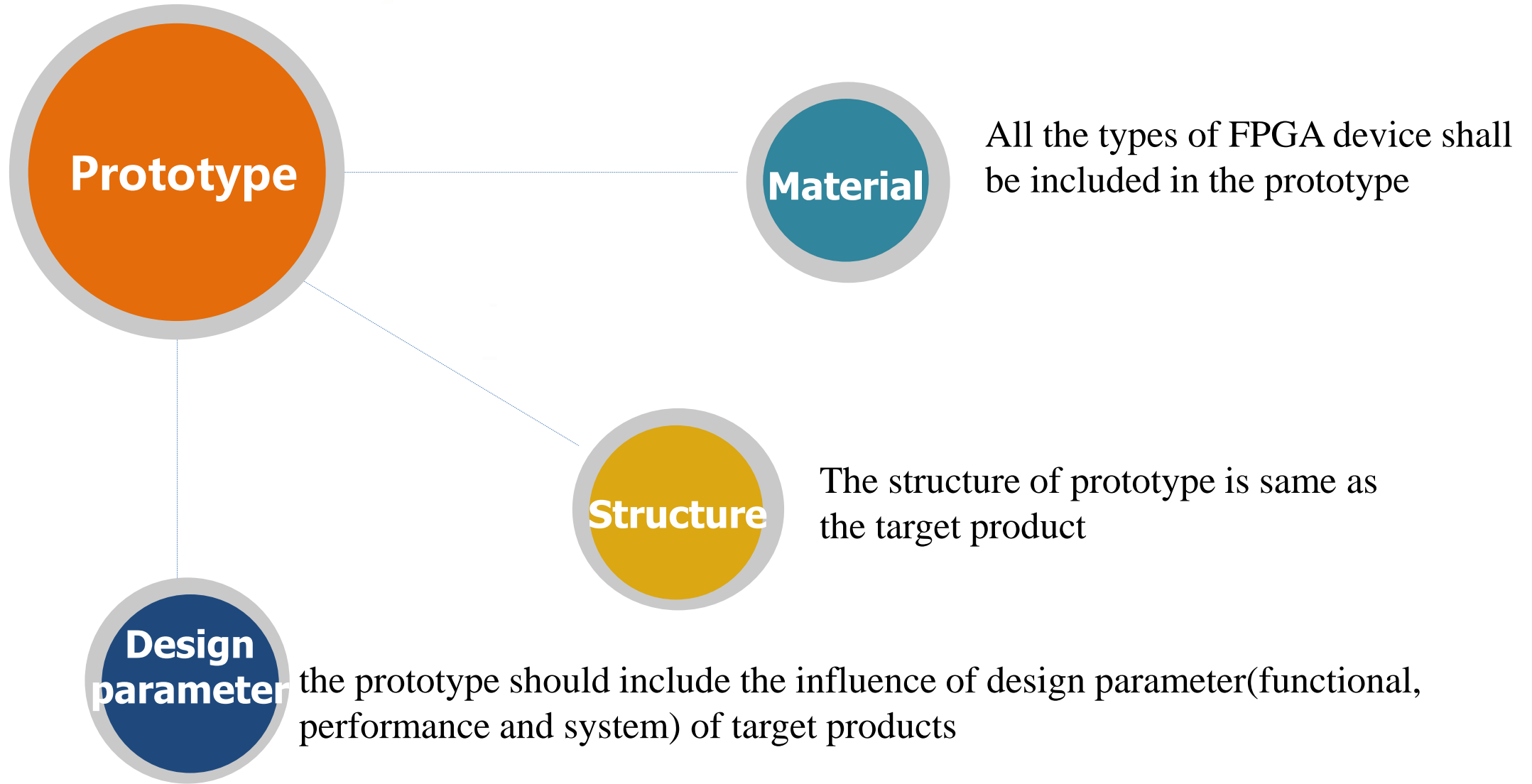
According to IEC61513, IEEE7-4.3.2, IEC62566 and IEEE1074

## NicSys®8000N Development Life Cycle



# CNCS V&V

Lifecycle	System requirement	System architectural Design	Detailed Design		Implementation	Integration			Validation
			Module Requirement	Module Design		Module Integration	Module Validation	System Integration	
IEEE 1012	Concep V&V, Requirement V&V	Design V&V			Implementation V&V	Test V&V			
V&V Tasks	( 1 ) System requirement evaluation ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) System integration V&V test plan generation ( 6 ) System validation V&V test plan generation ( 7 ) Hazard analysis ( 8 ) Security analysis ( 9 ) Risk analysis	( 1 ) System design evaluation ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) System integration V&V test design generation ( 6 ) System validation V&V test design generation ( 7 ) Hazard analysis ( 8 ) Security analysis ( 9 ) Risk analysis	( 1 ) Module requirement evaluation ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) Module integration V&V test plan generation ( 6 ) Module validation V&V test design generation ( 7 ) Hazard analysis ( 8 ) Security analysis ( 9 ) Risk analysis	( 1 ) Module design evaluation ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) Module integration V&V test design generation ( 6 ) Module validation V&V test design generation ( 7 ) Hazard analysis ( 8 ) Security analysis ( 9 ) Risk analysis	( 1 ) source code documentation evaluation ( 2 ) Criticality analysis ( 3 ) Module integration V&V test case generation ( 4 ) Module validation V&V test case generation ( 5 ) Hazard analysis ( 6 ) Security analysis ( 7 ) Risk analysis	( 1 ) Module integration V&V test execution ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) Hazard analysis ( 6 ) Security analysis ( 7 ) Risk analysis	( 1 ) Module validation V&V test execution ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) Hazard analysis ( 6 ) Security analysis ( 7 ) Risk analysis	( 1 ) System integration V&V test execution ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) Hazard analysis ( 6 ) Security analysis ( 7 ) Risk analysis	( 1 ) System validation V&V test execution ( 2 ) Interface analysis ( 3 ) Traceability analysis ( 4 ) Criticality analysis ( 5 ) Hazard analysis ( 6 ) Security analysis ( 7 ) Risk analysis





## Benchmark Test

Equipment Compliance Inspection,  
Benchmark Functional Performance Test  
Prudency/Operability test

## EMC Test

Electromagnetic Interference Test of  
Conductive (CE, CS) and Radiation (RE, RS)

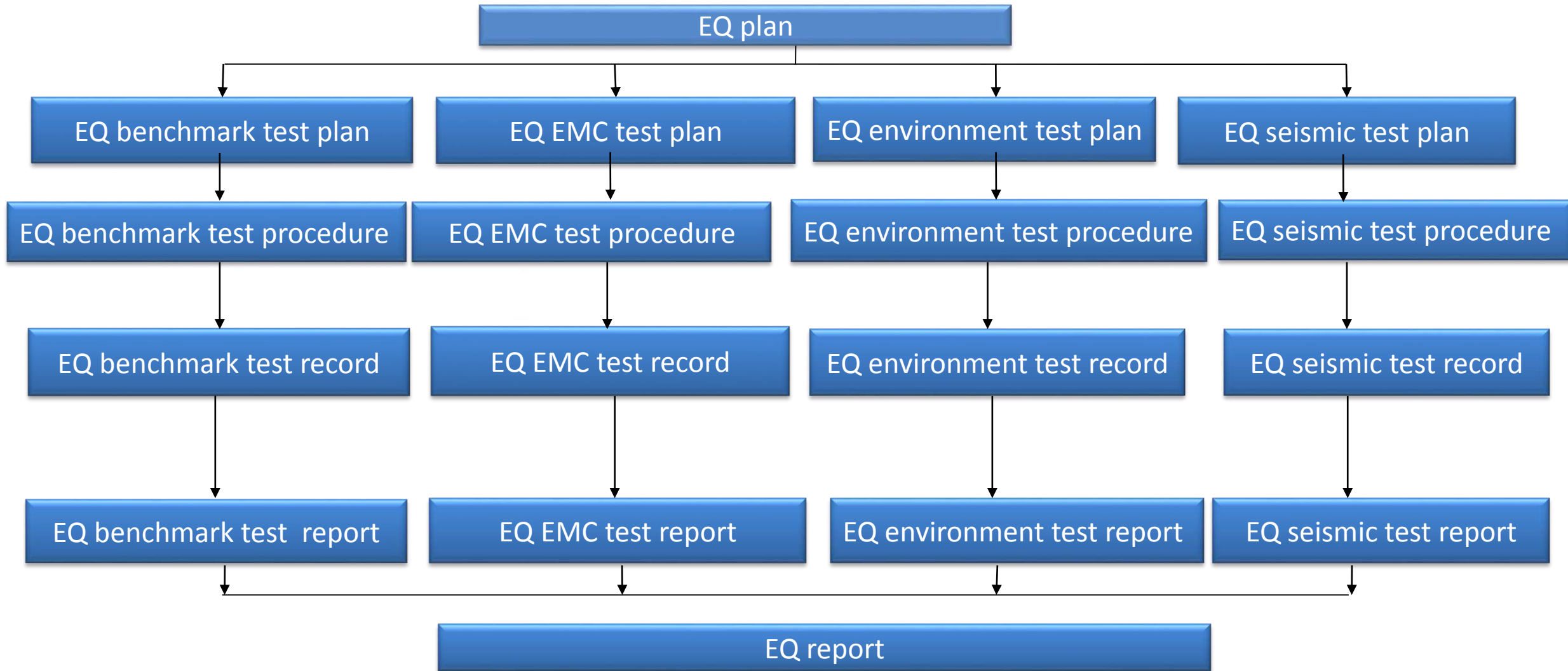
## Environmental test

Temperature, Humid, Long-running and  
Mechanical Vibration Test (including  
thermal aging, mechanical aging and aging  
test, etc.)

## Seismic test

Tests under conditions of the accident and  
after the accident.







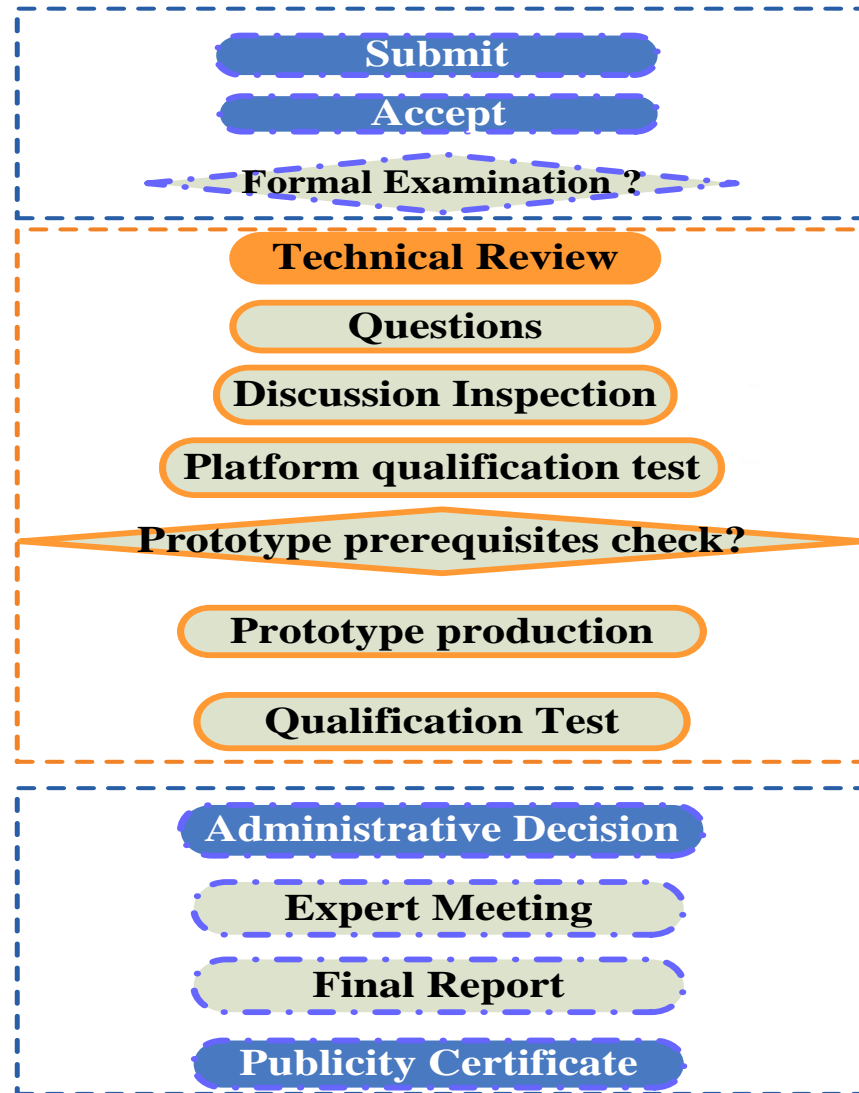
# Compare HAF601 and NRC License



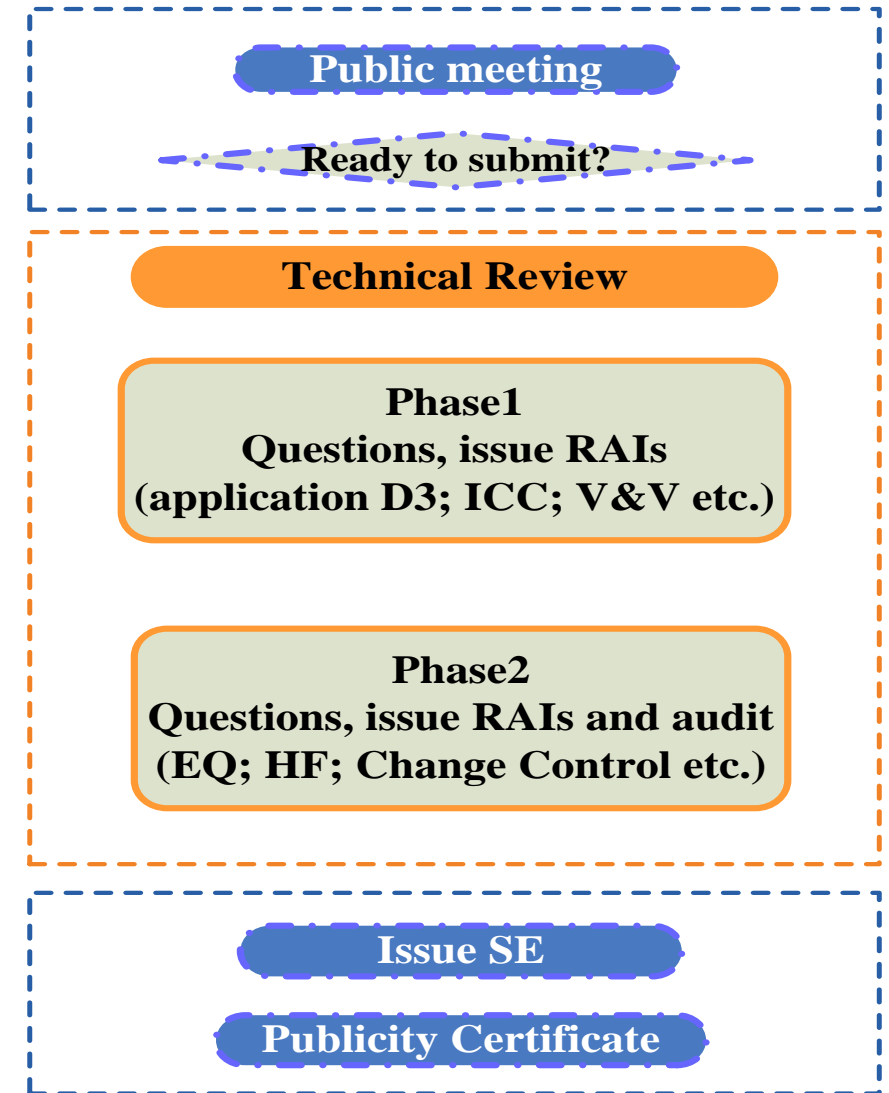


# Compare HAF601 and NRC License

## HAF601 License



## NRC License



# Differences

Comparison	HAF601 License	NRC License
<b>Standards</b>	GB/GJB/EJ/NB... (Refer to IAEA/IEC/IEEE)	Independent and Complete Standard System
<b>Supervision Method</b>	Design license Manufacturing license	None
<b>Quality Assurance</b>	HAF 003: 12 Elements	10 CFR 50 appendix B: 18 Elements
<b>CGID</b>	None(Vender responsibility)	EPRI/TR 106439 EPRI NP 5652 •••
•••	•••	•••





中核控制系统工程有限公司  
CHINA NUCLEAR CONTROL SYSTEM ENGINEERING CO., LTD.

CNCS

# Thank You For Your Attention!

Contact: [shenwanwan@cncs.bj.cn](mailto:shenwanwan@cncs.bj.cn)



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