

IDC Software for NDCs, Status and Future

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CTBTO
PREPARATORY COMMISSION

PUTTING AN
END TO NUCLEAR
EXPLOSIONS

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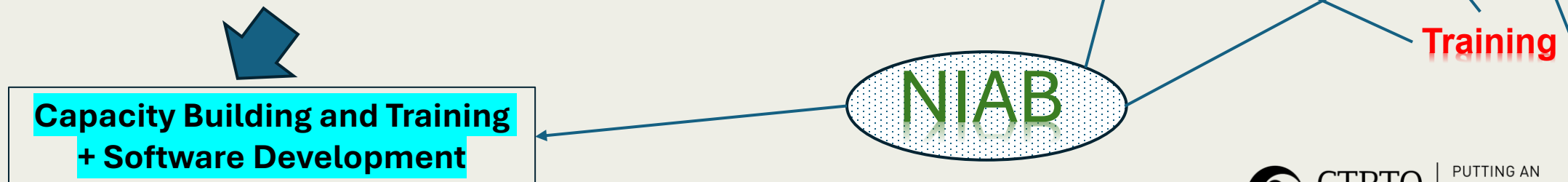
IDC Services to States (1/2)

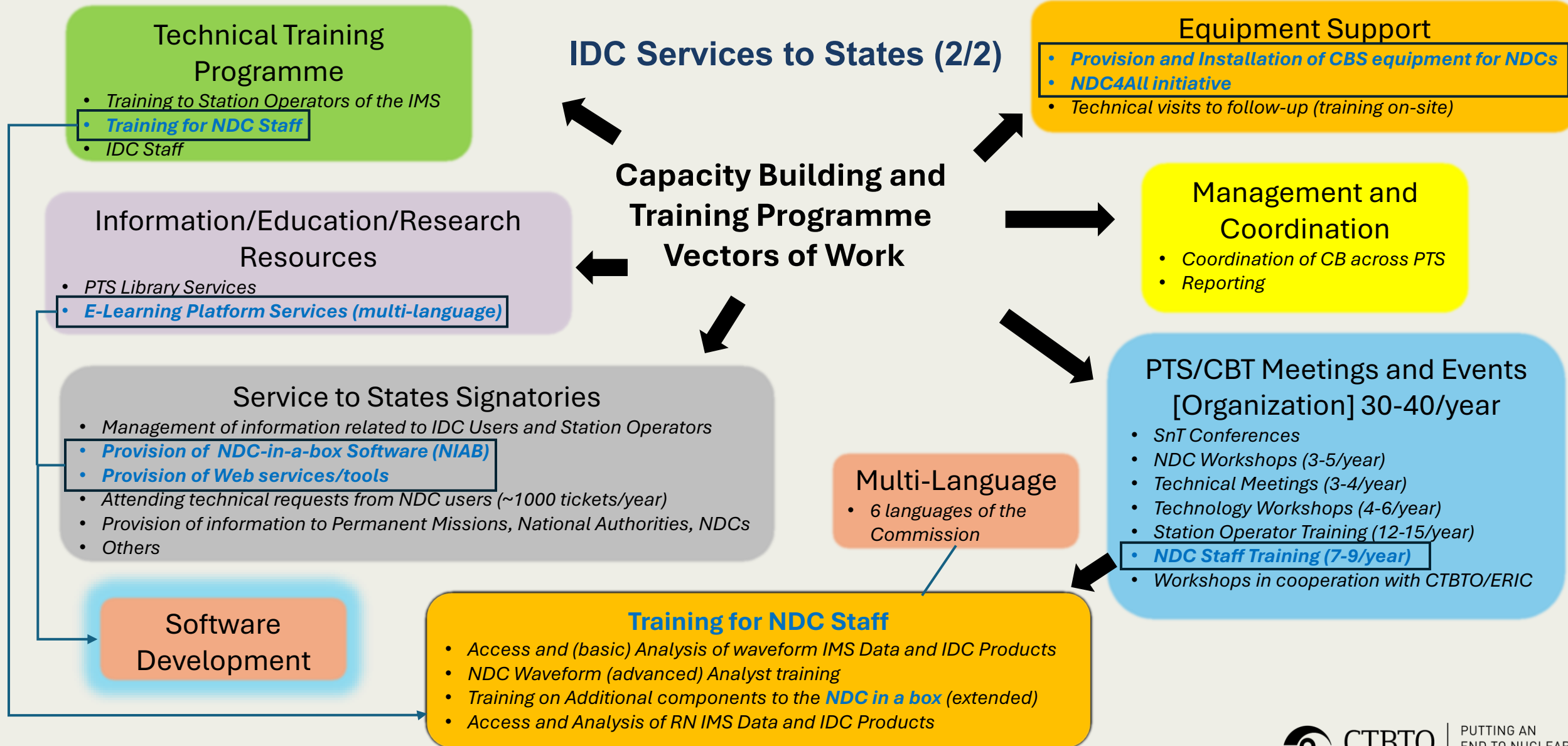
Technical assistance [CTBT Protocol Part 1 para 22]

22. The International Data Centre shall, where required, provide technical assistance to individual States Parties:

- (a) *In formulating their requirements for selection and screening of data and products;*
- (b) *By installing at the International Data Centre, at no cost to a requesting State Party for reasonable efforts, computer algorithms or software provided by that State Party to compute new signal and event parameters that are not included in the Operational Manual for the International Data Centre, the output being considered products of the requesting State Party; and*
- (c) *By assisting States Parties to develop the capability to receive, process and analyse International Monitoring System data at a national data centre.*

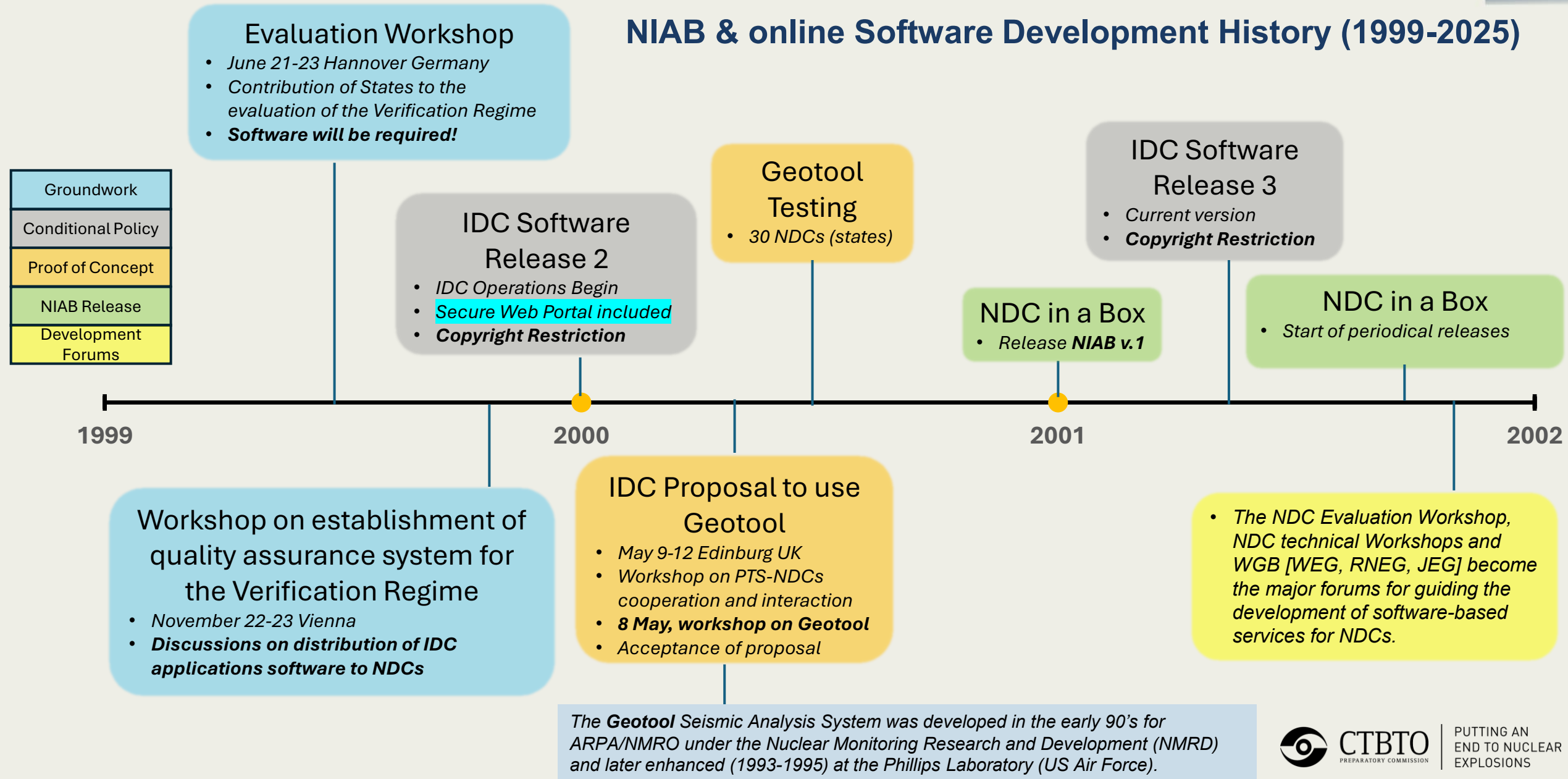
Technical support





PUTTING AN END TO NUCLEAR EXPLOSIONS

NIAB & online Software Development History (1999-2025)



NIAB & online Software Development History (1999-2025)

SnT2017
Showcase the use of NIAB v.4x generation

NDC in a Box

- **NIAB v.2**
- Updates across applications

Single-Sign-On (SSO)
CTBTO Web Portal

Alpha Testers

- SHI, extended NIAB
- 11 NDCs

NDC in a Box

- **NIAB (extended) v.4.x**
- RN (qcecorr, bg_analyze, Autosaint, Norfy, Saint2, iNSPIRE)
- SHI (adds SeisComp, DTK-(G)PMCC, DTK-DIVA, Qt version of Geotool)
- ATM (WebGrape)

NDC in a Box

- **NIAB v.5x generation**

SeedLink Service

NDC in a Box

- **NIAB v.7x generation**
- Linux 9

FDSN Service

VDMS 4.2.0

2002 2004 2006 2008 2010 2012 2014 2016 2018 2020 2022 2024 2026

NDC in a Box

- **NIAB v.3**
- Adds WebGrape and srsget
- Support 64bit

Beta Testers

- WebGrape IBS
- 11 NDCs

NDC Forum

- May-June 2018: Survey on use of NIAB by NDCs
- 18 June 2018
<https://ndc-forum.ctbto.org>

NDC in a Box

- **NIAB v.7.2 & 7.3**
- iNSPIRE matches IDC Operational software

(first) NDC Workshop

- Becomes an important forum for guiding the development.
- NDC Preparedness Exercised NPEs

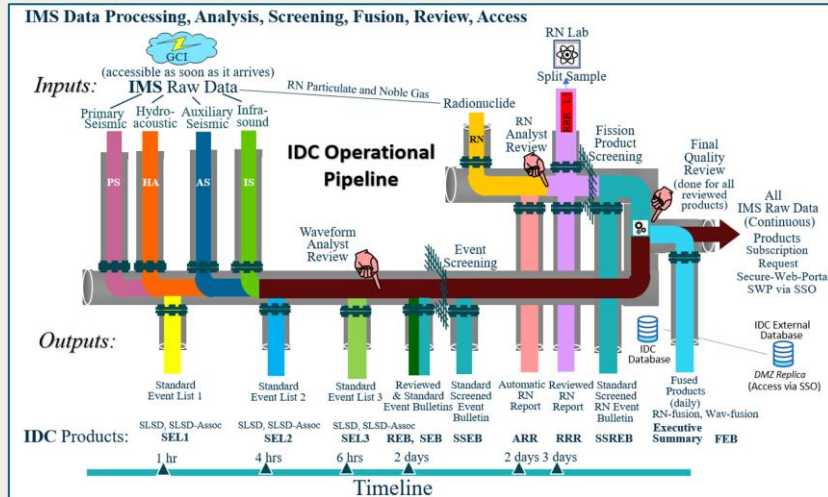
RNToolkit Web

Online service

Testing

NIAB Release

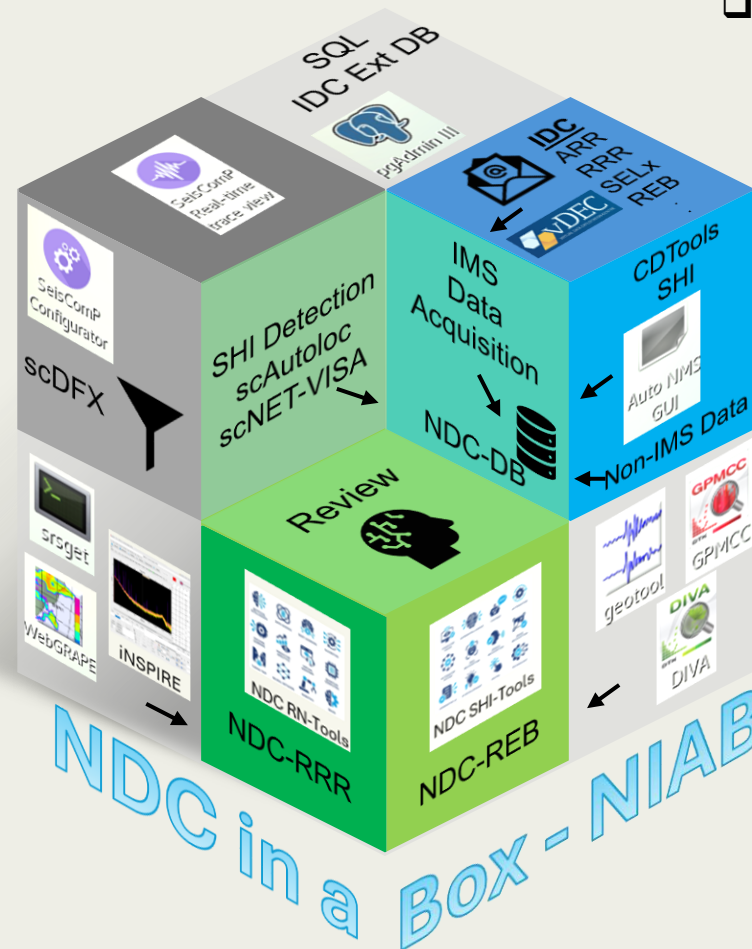
Development
Forums



NIAB Software Scope

- ❑ The NIAB includes SHI Detection (scDFX)
- ❑ Automatic seismoacoustic event location (scAutoloc and scNET-VISA)

- ❑ In analogy to the IDC operational pipeline, the NIAB has been designed for IMS data acquisition.
- ❑ It has also been empowered with capability of acquisition of non-IMS Data and IDC Products.
- ❑ The suite includes a relational NDC database



- ❑ Tools for
 - ❑ Database Administration
 - ❑ Data analysis and
 - ❑ Reporting

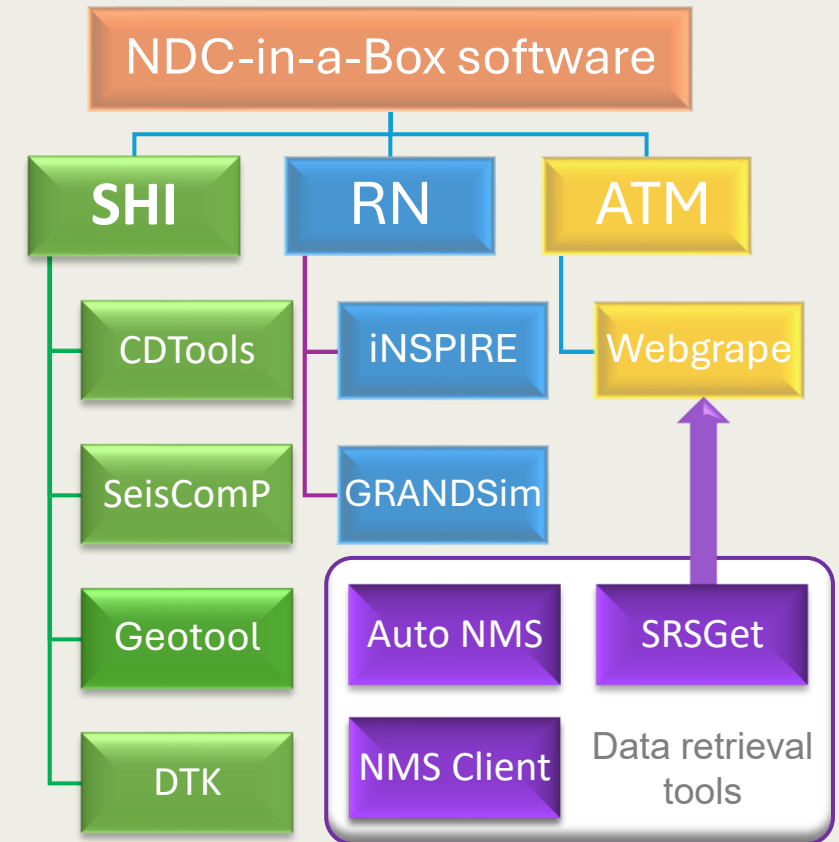
NDC in a Box - NIAB

Software	Operating System	Major Components	Release Date
SHI-NIAB Version 7.2	Rocky Linux 9.5	SeisComP v.6.6.3 Geotool v.3.2.4 Geotool Qt v 5.2_3.1.0 NET-VISA v.2.5.15 DTK-PMCC v.7.4.1 DIVA v.4.5.2 CDTools v.2.5.10rc1 (LibCD 2.6.2) NMS_client v.1.0	February 2025
RN-NIAB Version 7.2	Rocky Linux 9.5	iNSPIRE v.2.30.0 GRANDSim v.1.0.42	February 2025
WebGRAPE (ATM)	Windows and Linux	Webgrape Desktop v.3.2.4 srsget v 0.26	July 2025

Other tools and services provided to NDCs (online)

Technology	Service	Release Date
SHI	FDSN web service SeedLink service VDMS 4.2.0 / VDMS Client 1.4.8	December 2023 January 2021 July 2025
RN	RNToolkit web https://rntoolkit.ctbto.org	March 2021
WebGRAPE (ATM)	Webgrape Internet Based Service (IBS) v.3.2.4 https://webgrape.ctbto.org	July 2025

SnT2025 Snapshot of NIAB (Inventory) + additional online services



The Future of Software-based Services to States (2026→)

- ❑ The methods of interaction between the IDC and NDCs on software development for NDCs include
 - *NDC Forum (<https://ndc-forum.ctbto.org>)*
 - *NDC Support (email: support@ctbto.org)*
 - *NDC Workshop hosted by states (every 2 years, 2026 is being planned)*
 - *NDC Training courses, feedback from participants*
 - *WGB NDC Issues and Capacity Building*
 - *WGB [Waveform Expert Group (EG), Radionuclide Expert Group, Joint Expert Group (JEG)]*
 - *Support to the NDC Preparedness Exercises (NPEs)*
- ❑ Several areas for improvement are identified
 - *The NIAB needs to (eventually) replicate the IDC Operational software results*
 - ❑ *SHI-NIAB is pending on the IDC SHI Software re-engineering project (ongoing since 2011)*
 - ❑ *RN-NIAB needs a mechanism acquire the same automatic processing results of IDC Operations*
 - *The future role of AI in the NDC software is to be explored*
 - *Additional online services*
 - *Other features in accordance to needs*
- ❑ **Proposal:** An additional (highly focused) Technical Meeting on NDC Software to be established on ad hoc basis
 - *Sponsored by the PTS and States*
 - *Bring together participants from NDCs (with recognized experience on the use of the NIAB)*
 - *Define additional software-based services online*
 - *i.e. Implementation of NIAB online for emerging NDCs [alternative to Capacity Building System (CBS)]*
 - *Promote exchange of NDC-tools and feasibility to be part of the NIAB*

CONCLUSIONS

- ❑ The provision of software-based services for NDCs is a fundamental part of the technical assistance, as it provides the States with the capability to use the IMS Data and IDC Products for treaty verification related issues, as well as for issues of national interest by combining IMS data and IDC information to local available resources.
 - ❑ *The NDC-in-a-Box (NIAB) is a software suite that has been tailored for (and under the guidance of) experts from States. The strategic approach for developing the NIAB has proven to be efficient, as a result, the NIAB has reached an advanced development status (maturity) but there is a path to follow and more milestones to achieve.*
 - ❑ *The software-based online services provide the NDCs with a window into the IDC Operational Pipeline and additional educational and information resources.*
- ❑ The NDC Workshop and WGB technology groups serve as forums for guidance on the needs of NDCs, but they are not fully dedicated to this task.
- ❑ The NDC forum is an excellent resource for discussion on the existing software-based services, but it is limited in terms of providing further guidance (it requires dedicated human resources and interaction).
- ❑ **The IDC plans to continue with the same development approach, but some areas have been identified to require special attention (a spinoff).** To achieve this objective, the IDC is planning to create a new chapter of technical meetings, focusing on the intermediate and far future of the NIAB and online services.
- ❑ **To be announced in 2026 !**