Virtual Labs

Making engineering education engaging, effective, immersive and online

March 2017

Virtual Labs- an MHRD – NMEICT Initiative

A lab is a critical component of engineering education.
This requires students to work in a laboratory to promote discovery and creativity.

1. A Repository of experiments done physically in College Labs in a Virtual Form
2. Provides remote access to labs in various disciplines of Science and Engineering.
3. Experiments can be performed from anywhere anytime.
4. Physical distance to labs no longer a limitation to learning
5. Are absolutely free and complement physical labs.
6. 10 Domains – Engineering, Physics, Chemistry, Bio-technology , Mathematics ….
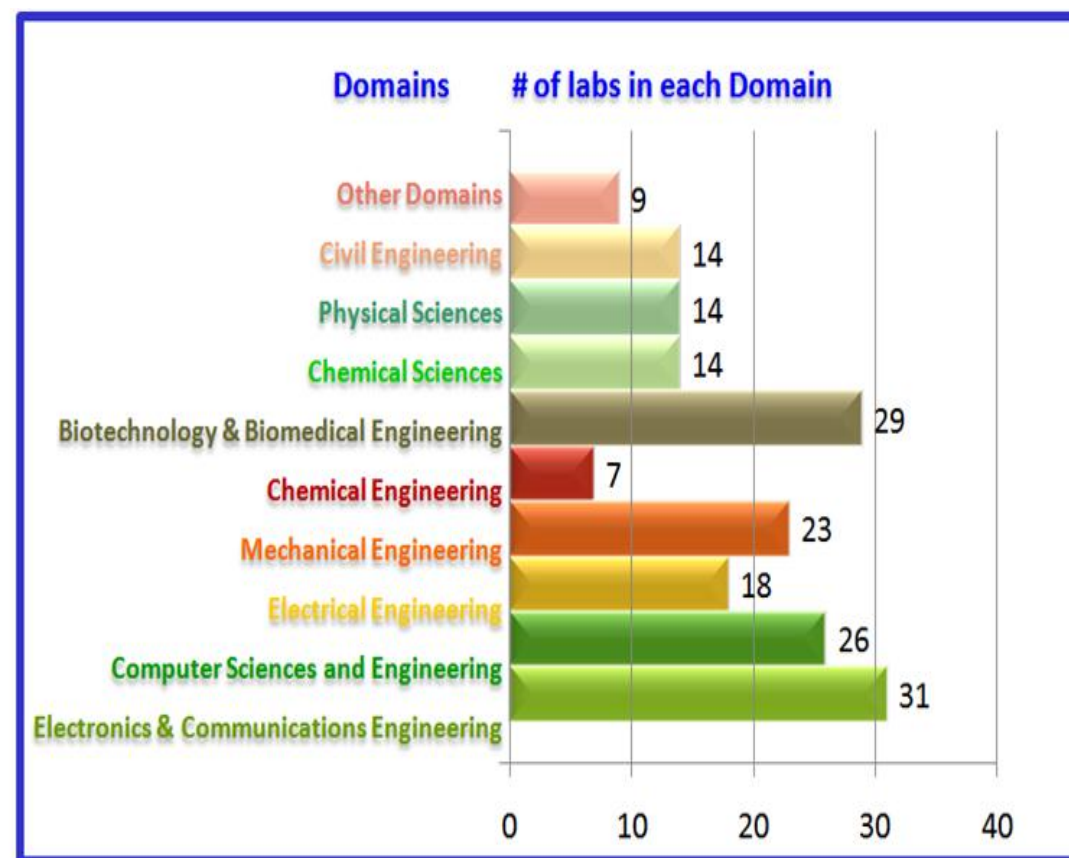7. Built by 12Leading Partner Institutes such as 67IITs, IIITH , NITK, Amrita, CoEP, Dayalbagh

Virtual Lab are Efficient useful teaching aids , supplement the curriculum.
Enable students and others to learn and internalize the concepts

Benefits for Teachers/ Faculty

Virtual Labs give Faculty many advantages, are potential ways to enthuse, make teaching effective and interesting

- ❖ Efficient & useful teaching aid
- ❖ Contribute to development of Virtual Labs
- ❖ Use Virtual Labs to supplement curriculum
- ❖ Internship opportunities for students
- ❖ Institute Best Practices available from Leaders
- ❖ Good Assessment Tool for students
- ❖ Related NPTEL Lecture Videos
- ❖ Provides all the relevant material at one place
  - ❖ objectives of the experiment
  - ❖ procedure
  - ❖ lab-manual
  - ❖ pre- and post-experiment quizzes
  - ❖ additional Lab resources
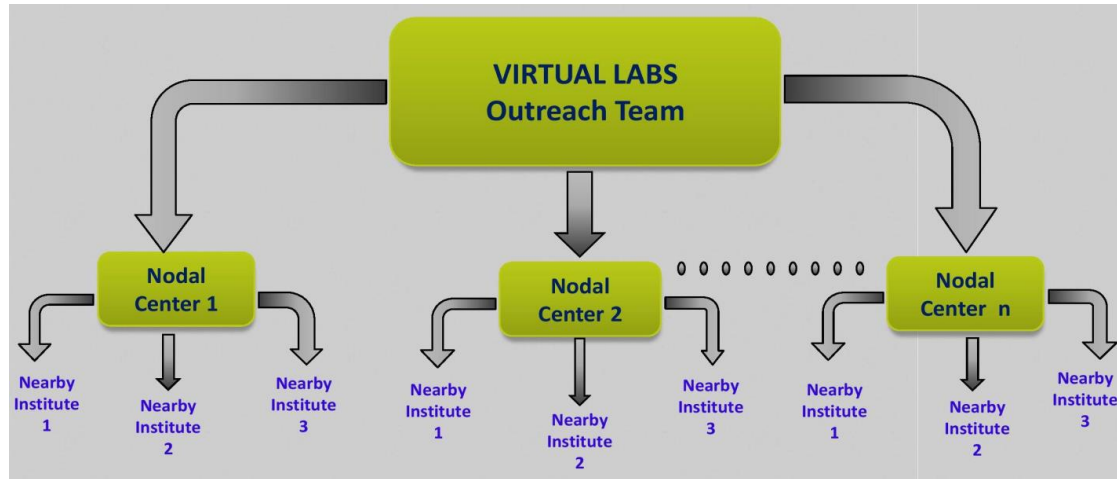 - ❖ Virtual Lab experiment

Use the large spread of Labs and Experiments to create a greater impact on the students learning effectiveness

Domains　　**# of labs in each Domain**

Domain	# of labs
Other Domains	9
Civil Engineering	14
Physical Sciences	14
Chemical Sciences	14
Biotechnology & Biomedical Engineering	29
Chemical Engineering	7
Mechanical Engineering	23
Electrical Engineering	18
Computer Sciences and Engineering	26
Electronics & Communications Engineering	31

Benefits to Students

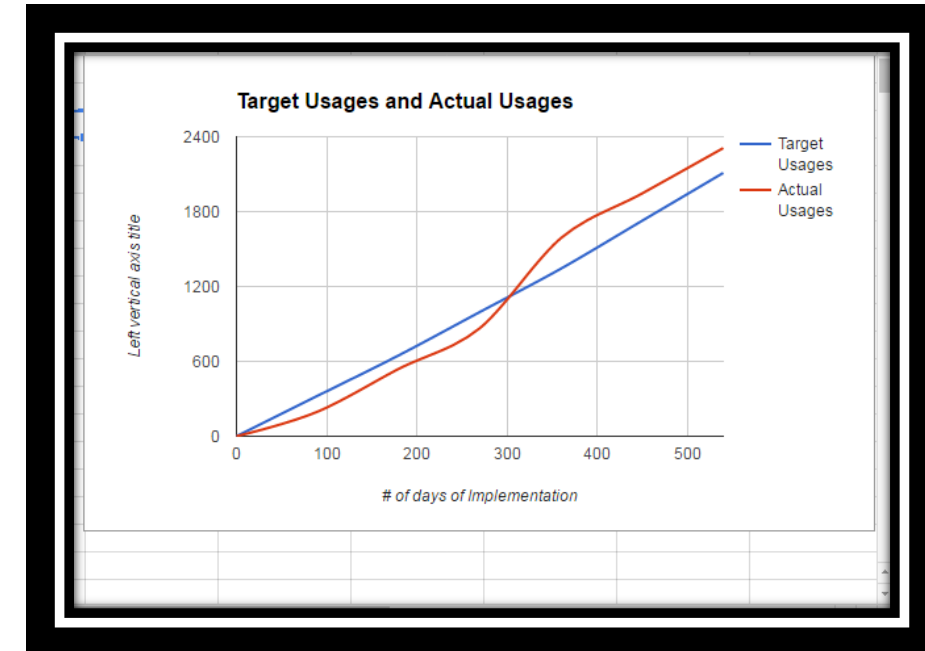Virtual Labs provide the undergraduate and post graduate students & researchers access to Virtual Experiments

- Enables students to learn at their own pace
- Enthuses them to conduct experiments
- Easy online access to labs at all times
- Experiments can be performed remotely as needed
- Access to high quality resources for free
- Internship opportunities
- Does not need additional infrastructural setup for conducting experiments

- A complete learning management system. Provides access to:
- Various tools for learning
- additional web-resources
- video-lectures
- animated demonstration
- self evaluation
- Virtual Labs complement physical labs.
- One Computer with internet connectivity is all that is needed to perform the experiment

Virtual Labs enable to Students to per form experiments remotely as an on-demand service over the web.

Outreach and Impact

❖Diffusion of Virtual Labs done through a network of Nodal Centers

❖An Institute that has interest in diffusion trains and trains colleges around it on Usage of Labs

❖ Nodal Centers and the Coordinators conduct workshops to diffuse the usage of Labs in colleges near them

- ❖ 15.88 Lakh Usages from 77100 students, 425 workshops, 325 Nodal Centers, 726 Workshops.
- ❖ Labs completely linked to NPTEL
- ❖ Recorded in the National Digital Library for posterity
- ❖ Labs and Outreach being prepared for rapid growth - spread over colleges, Usages and alignment of experiments to the needs of colleges

College Cloud Edition of Virtual Labs

Virtual Labs College Cloud Edition (Internet Independent)

❖ Portable-Edition for Virtual Labs connected to the LAN
❖ An offline version- experiments and theoretical content.
❖ A cost-effective Learning Management System.
❖ Accessed directly from the local machine through the LAN. Hence it is called a College Cloud.   .
❖   Number of Labs accessible is limited by
–   a pre-definition, configuration of the server

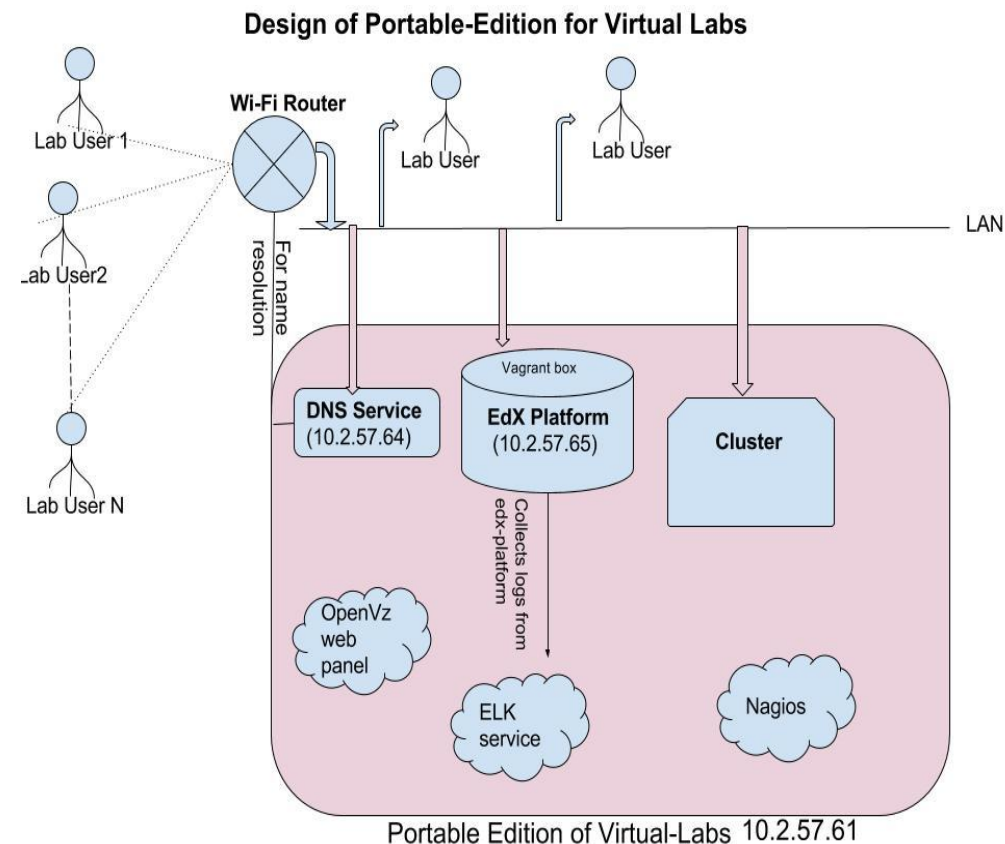## Current Version of CCE - Limitations

Server Configuration
>=32 GB RAM, Xenon processor
Intel i7 , 16GB RAM machine

i3   with 8 GB RAM

Usage limitations
All Labs started
50-100 concurrent users
one lab at a time - max. 10 labs
running at a given instance
25 users-3 labs running
at a given instance

Design of Portable-Edition for Virtual Labs

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Thank You

Access Virtual Labs at:

https://vlabs.ac.in

Virtual Labs

VLEAD, Vindhya C-6

IIIT Hyderabad, India

Virtual Labs web page: vlabs.ac.in

Technical feedback: engg@vlabs.ac.in

Jobs/internships: jobs@vlabs.ac.in

Contribute to Virtual Labs at:

http://vlabs-dev.vlabs.ac.in/gsoc-2016/ideas-list.html

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