National Medical Oxygen Grid (NMOG)

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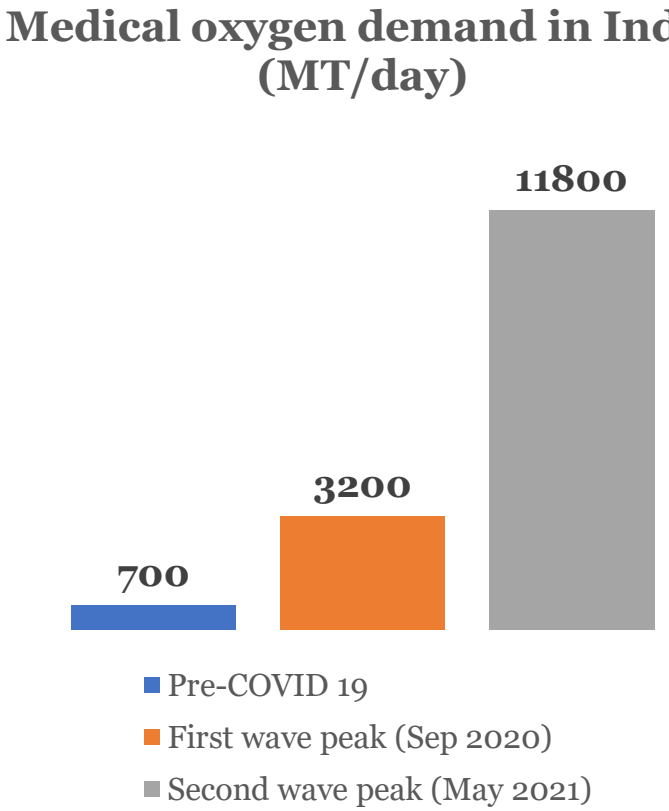
Need for National Medical Oxygen Grid (NMOG)



- At the height of India's COVID-19 medical oxygen shortage, **multiple IT platforms were developed** by various stakeholders with the goals of aggregating, monitoring, and allocating India's medical oxygen supply.
- Oxygen Digital Tracking System (ODTS), the Oxygen Demand Aggregation System (ODAS), and the OxyCare Management Information System (OC-MIS).
- **Proved to be invaluable assets** that allowed the authorities at district, state and national level to make meaningful decisions based on the aggregated data to optimize faster delivery of oxygen.

Limitations

- Not integrated with each other
- Not capturing all assets
- No dashboards, no decision analytics
- Mostly web portals and no offline mode
- Not user friendly

National Medical Oxygen Grid's (NMOG's) working & operations

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One time activity:
- Facility registration with HFR ID under ABDM
- Facility to declare their oxygen assets

Daily data entry:
- Bed occupancy
- Disease specific patient load
- Oxygen stock, supply raised & received, consumed

Data entry personnel: Oxygen asset operator/staff nurse/ pharmacist

Data entry: Under the supervision of oxygen nodal person such as a specialist, anesthetist, etc.

Demand side

One time activity:
- Registration
- Declare their oxygen assets

Daily data entry:
- Orders received, accepted and dispatched
- Oxygen stock

Data entry personnel: Oxygen asset operator

Data entry: Under the supervision of facility manager

Supply side

NMOG IT Platform

Service Providers

Administrators - District/ State/ National

Suppliers

Dashboard indicators:

A. Facility Infra
- Manufacturing capacity, storage capacity
- Bed capacity

B. Last 30-day trends
- Oxygen supply received, manufactured, consumed
- Rational Use of Oxygen
- Bed occupancy

C. 7-day predictive trend
- Oxygen required
- Different types of bed required
- Case load of different patient types

Dashboard indicators:

A. Unit infra

Manufacturing capacity, storage capacity, transportation capacity

B. Last 30-day trends
- Demand received
- Oxygen supplied

Dashboard indicators:

A. District/ State/ National Infra
- Manufacturing capacity, storage capacity, transportation
- Different bed type capacity
- No. of PSA plants, concentrators, LMO tanks & tankers, cylinders

B. Last 30-day trends
- Oxygen supply received, manufactured, consumed
- Rational Use of Oxygen
- Bed occupancy

C. 7-day predictive trend
- Oxygen required
- Different types of bed required
- Case load of different patient types

D. Supplier details

Oxygen manufacturing capacity
Oxygen supplied to hospitals

Open to all tools

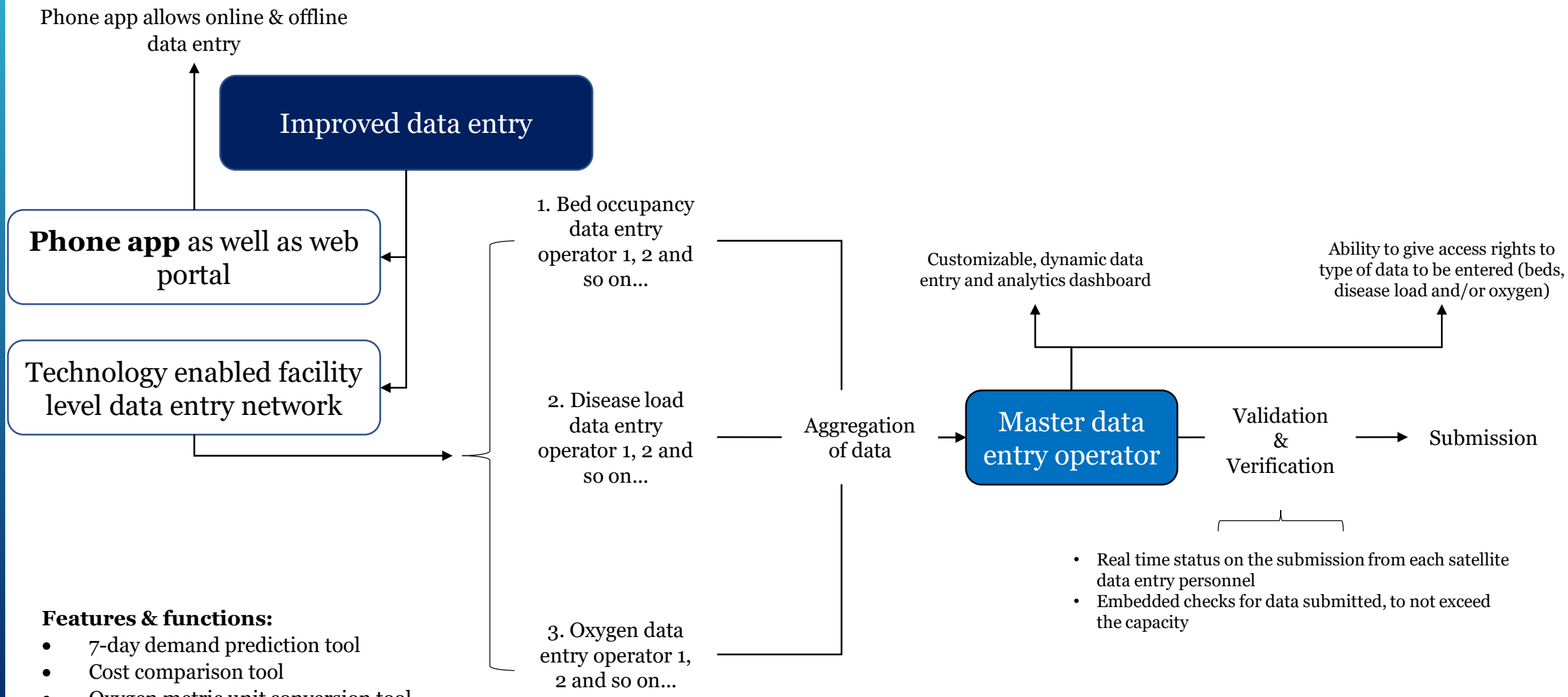
Knowledge products tool- Guidelines, training videos, posters

Oxygen therapy consumables based on facility type tool

Cost analysis of Oxygen sources tool

Oxygen Unit Conversion tool

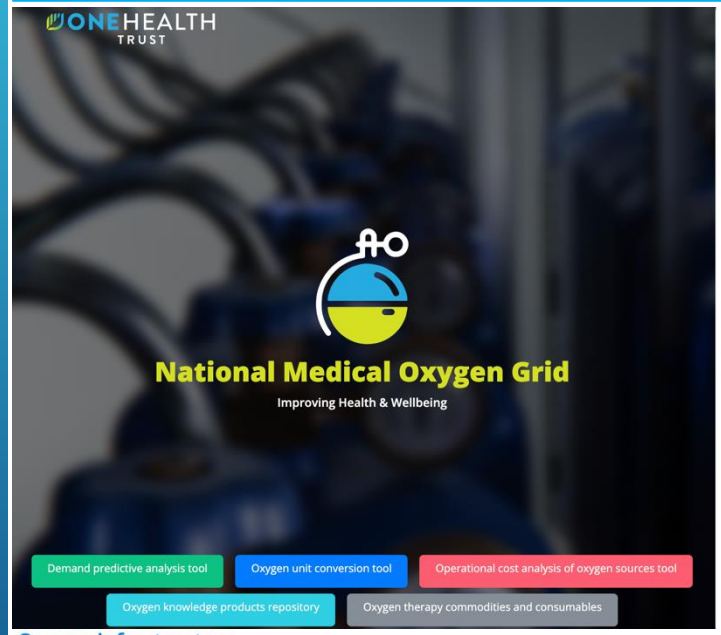
Specific efforts to improve data entry

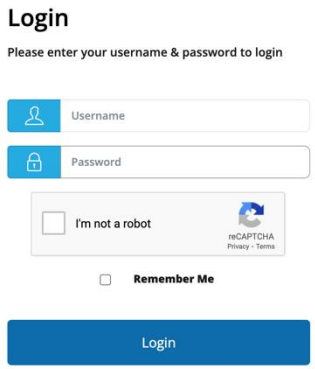


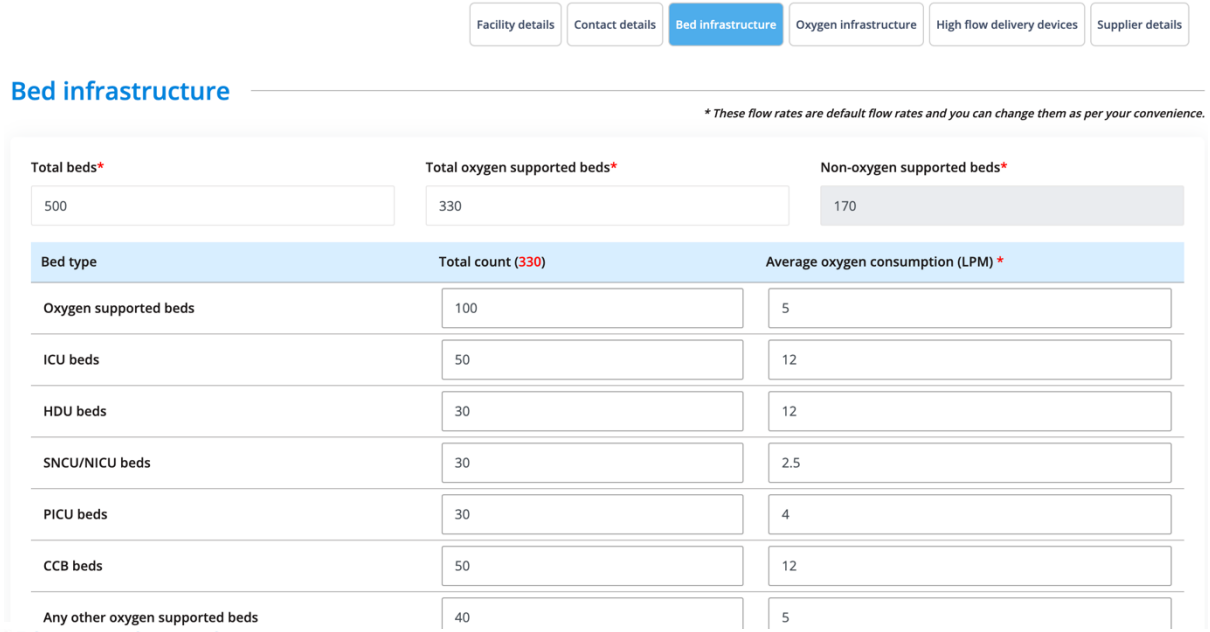
Features & functions:

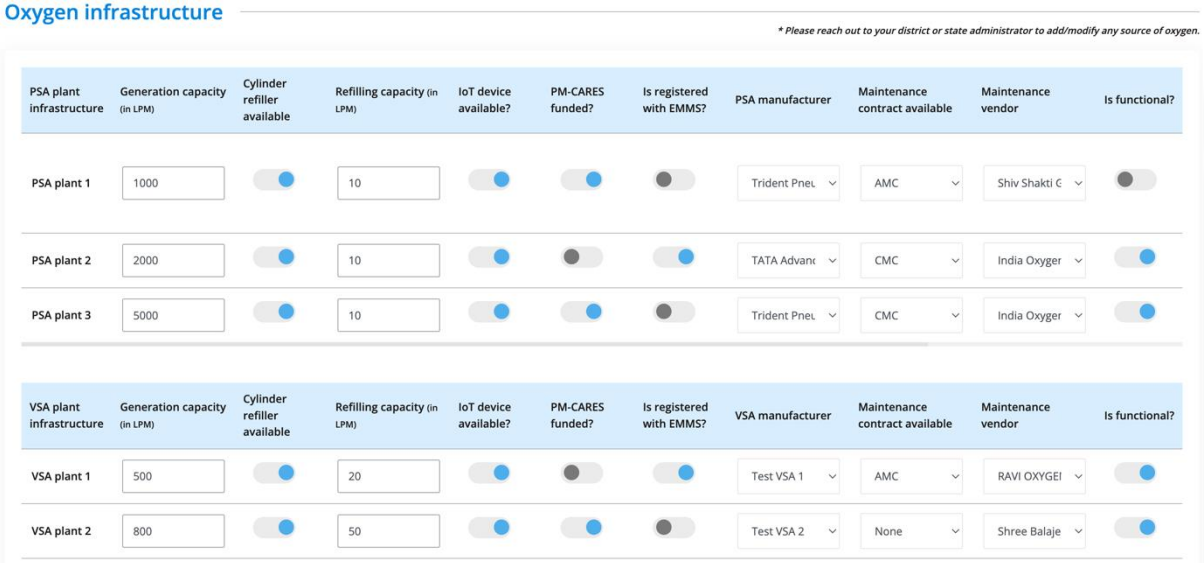
- 7-day demand prediction tool
- Cost comparison tool
- Oxygen metric unit conversion tool
- Differences in estimated vs actual consumption tool
- Global capacity building repository

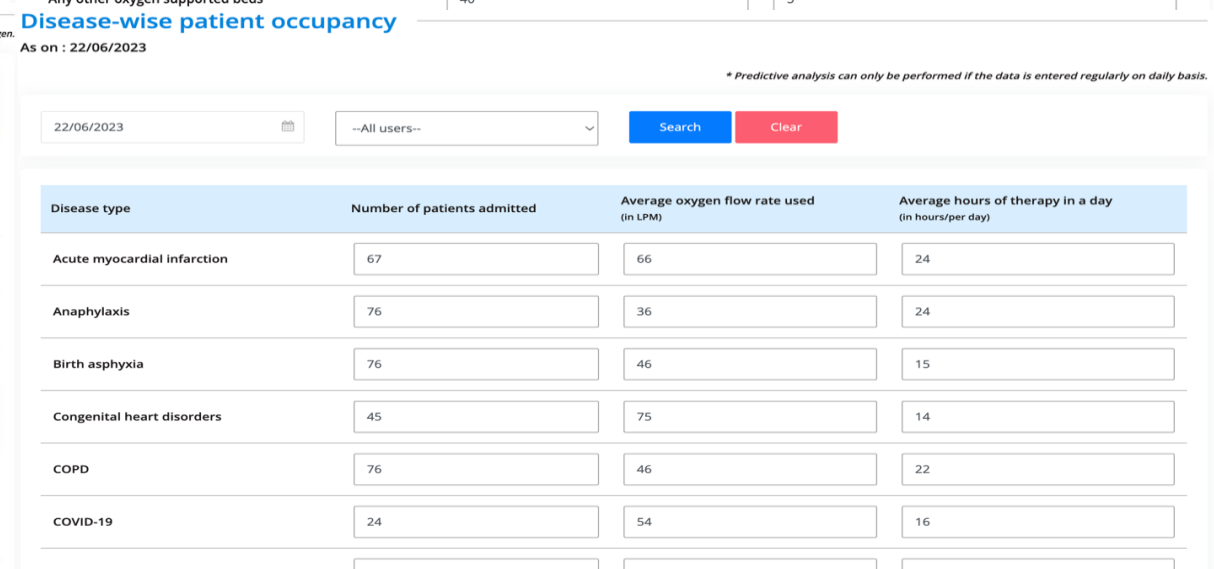
Web portal (https://oxygengrid.in/login)











Phone app

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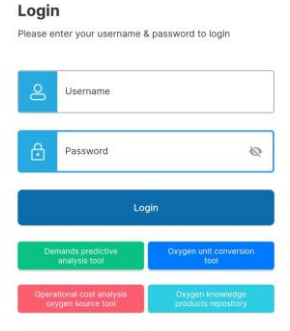
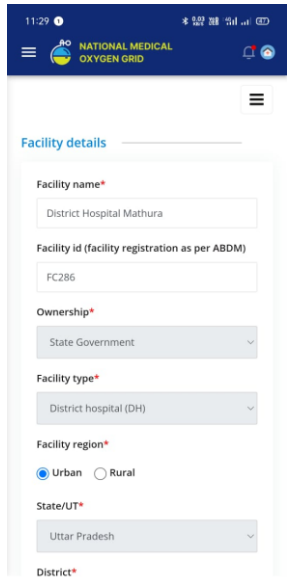
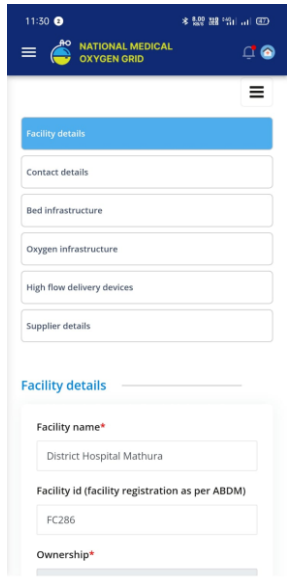
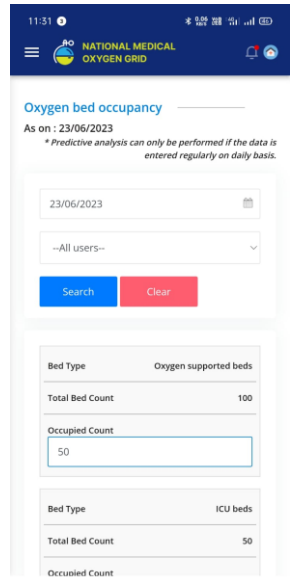
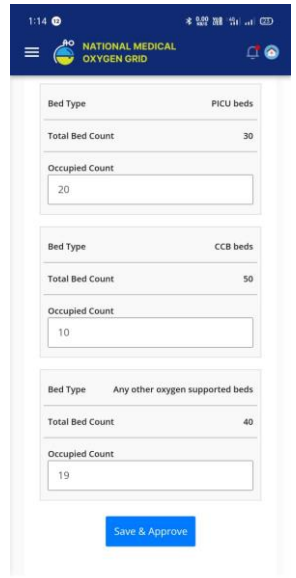
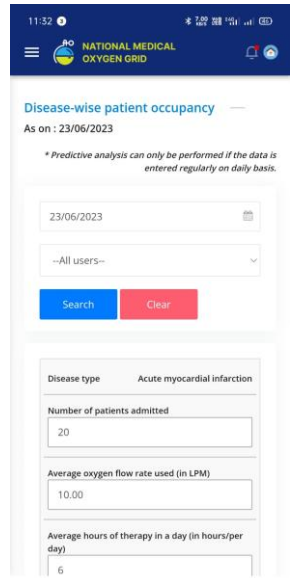


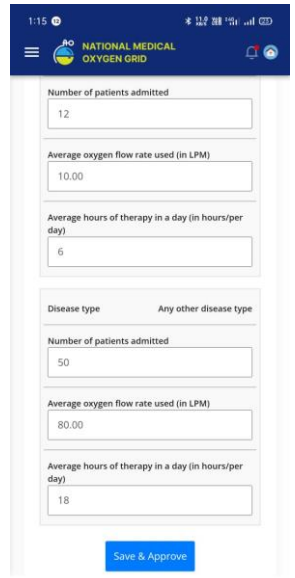


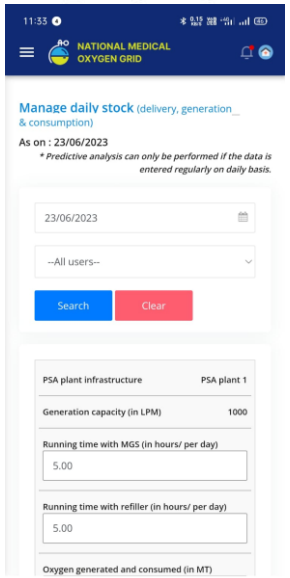


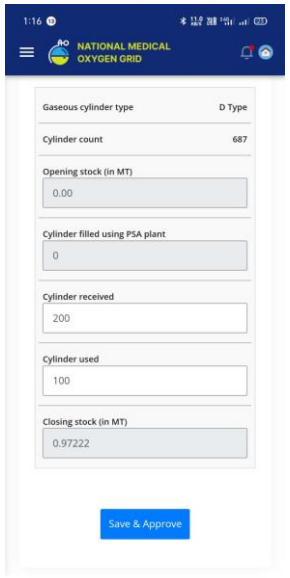


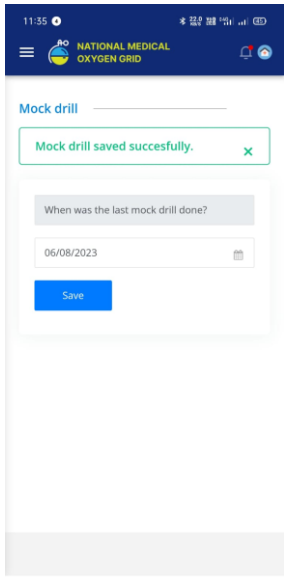


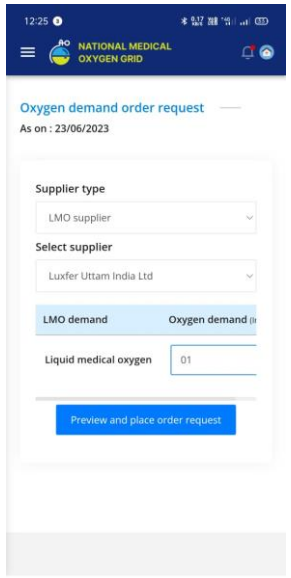


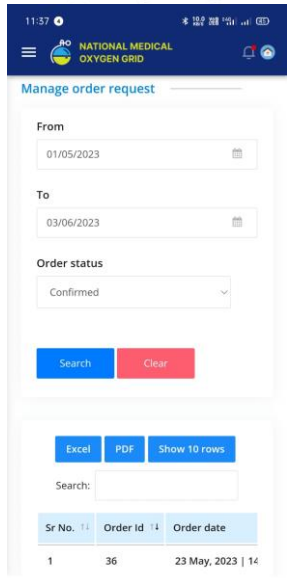


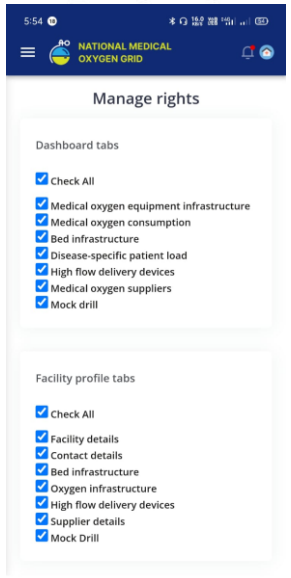


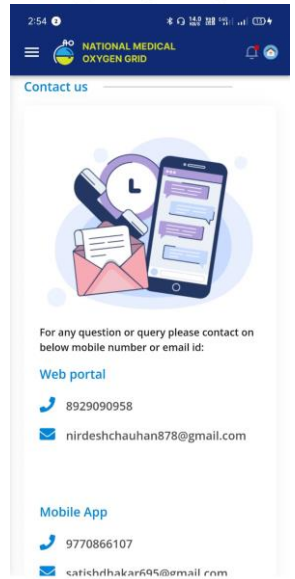








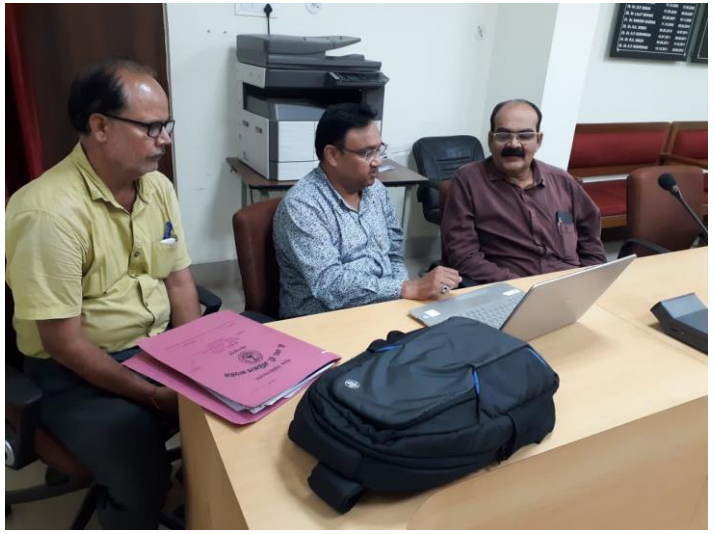




ODAS vs OCMIS vs NMOG

Metrics	ODAS	OCMIS	NMOG
Technology			
Intuitive user interface			✓
Master-satellite users			✓
Personalised GUI			✓
Web portal	✓	✓	✓
Phone app		✓	✓
Features & Functions			
Facility profile creation	✓	✓	✓
Oxygen infrastructure management	✓	✓	✓
Bed infrastructure management	✓		✓
Disease-wise patient management			✓
Mock drill management		✓	✓
Supplier management		✓	✓
Order placing & management (demand side)	✓	✓	✓
Order placing & management (supply side)			✓
Predictive analysis of oxygen demand, bed demand and disease-specific patient caseload			✓
Decision analytics on asset allocation and patient management			✓
Oxygen source operational cost analysis tool			✓
Rational use of oxygen tool			✓
Oxygen unit conversion tool			✓
Oxygen knowledge products repository			✓
Map based data visualisation			✓
Help & support			
User manual	✓	✓	✓
Video tutorial			✓
Accessible technical support/ grievance redressal mechanism		✓	✓

Implementation across UP and Karnataka



Recommendations from the data analysis & observations made

- **PSA plants with cylinder refilling stations** can improve their utilisation and supply cost-effective oxygen to other facilities in a hub-spoke model, would require PESO approval.
- **Equipment need to be registered on EMMS** and relevant stake holders should be aware of equipment maintenance practices as well as AMC/CMC contracts.
- In future, for enhancing any on-site oxygen manufacturing capacity, **VSA plants could be preferred over PSA plants to tackle issues related to noise, electricity costs, and for improved performance** in conditions with higher altitude and humidity.
- **Dura cylinders can ensure quick enhancement of mobile bulk liquid storage** capacity and do not require PESO approval.
- **Concentrators could be allocated to old age homes or for home care use** through concentrator banks.
- Gaseous **cylinders should be kept full at all times** as they have expiry date of 3 years from the date of filling.
- **Oxygen audit** on rational use of oxygen may be required to ensure no wastage of medical oxygen.

However, more and regular data on bed occupancy and disease specific patient load required to draw insights.

Testimonials from Uttar Pradesh and Karnataka

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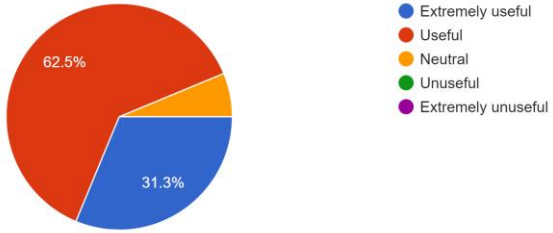
CHCs	SDHs	DHs	GMCs
"App is useful to document oxygen usage and **data entry made easy**." "**Easy to use the app** and data entry is simple." "Tool allows us to monitor our consumption and supply especially refilling of cylinders."	"**Very easy to use** and carefully designed tool." "The NMOG app is valuable as it allows us to monitor our oxygen consumption and manage the distribution of oxygen effectively. It enables us to track our daily oxygen usage and proves to be a beneficial tool for our hospital."	"Incredibly **practical tool** that facilitates the understanding on medical oxygen consumption" "Tool allows us to access comprehensive information regarding oxygen & bed availability and equipment specifications."	"**Novel and excellent app**, user-friendly interface **encourages consistent data entry**, **easy to use,** particularly effective for inventory monitoring." "**Highly beneficial** for our daily data entry needs, provides insights into bed occupancy, performs automatic calculations."
• Nursing Officers • PSA plant Operator	• Chief Pharmacist • Data Entry Operator	• Biomedical Engineer • Data Entry Operator	• Chief Pharmacist • Data Entry Operator

End user feedback (n=16)

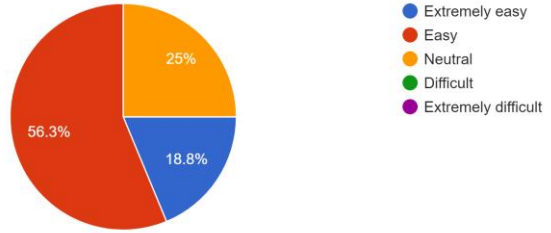
1. Did you find the new portal useful?

16 responses



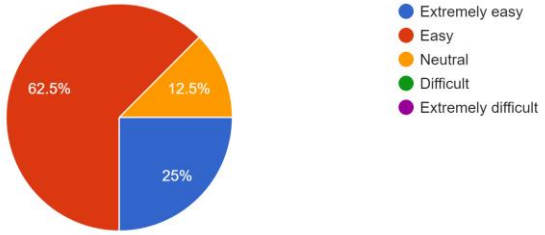
5. How easy was it to use or navigate through the new portal?

16 responses



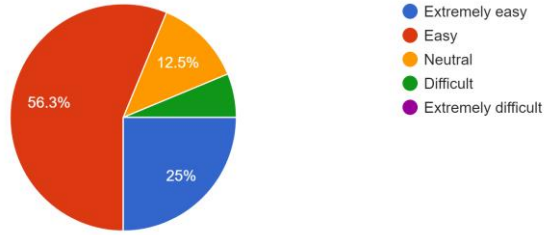
6. How easy was it to understand information on the new portal?

16 responses



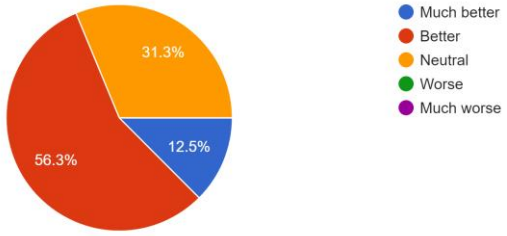
7. How easy was it to enter data on the new portal?

16 responses



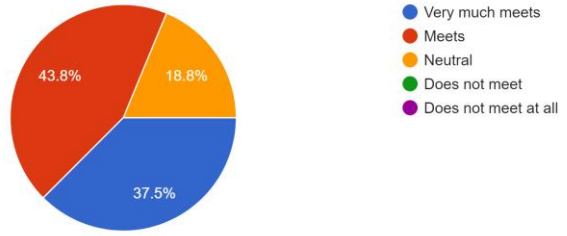
8. How was your experience in comparison to ODAS and OCMIS?

16 responses

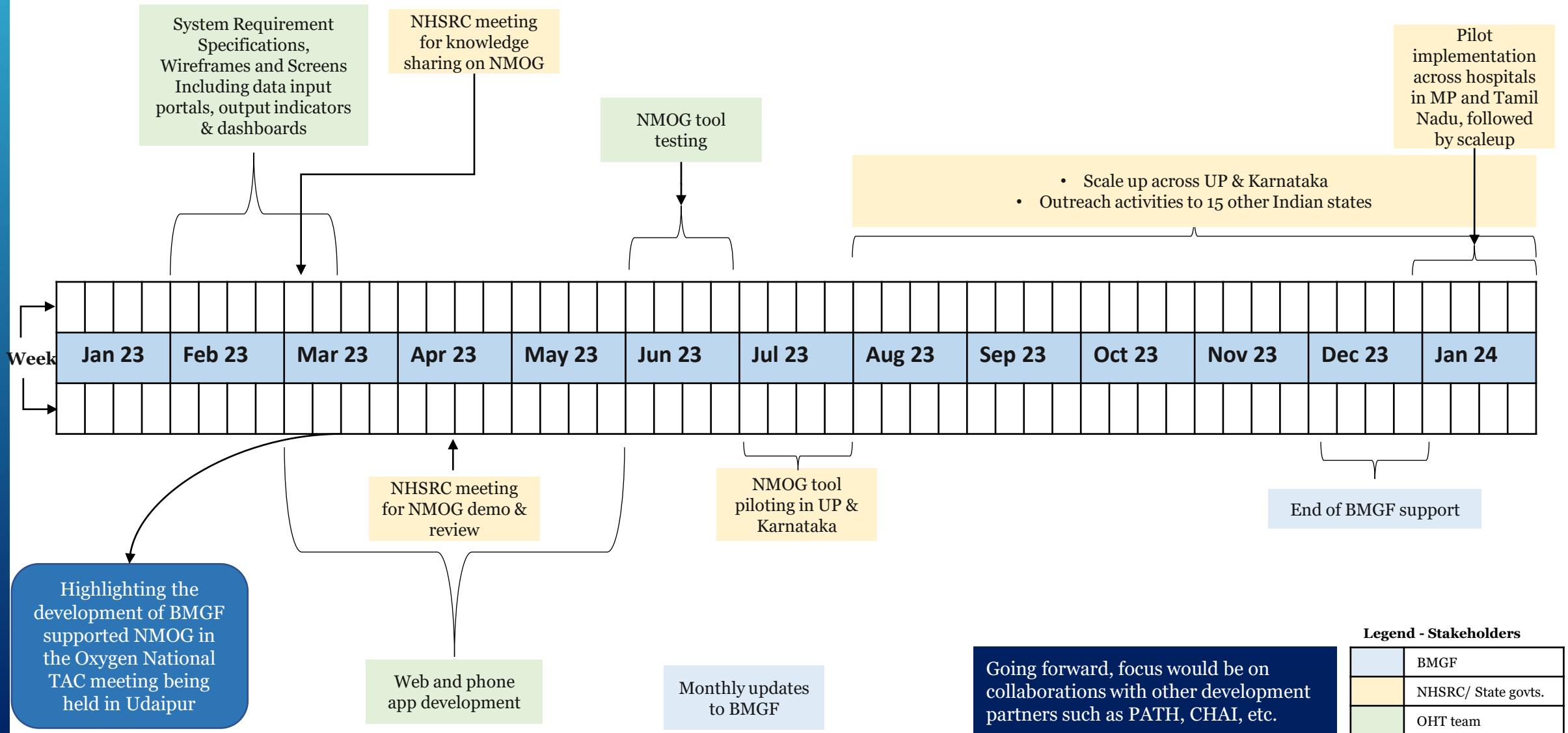


13. Does the new portal meet your expectations?

16 responses



National Medical Oxygen Grid (NMOG) development timelines



Current status of NMOG implementation

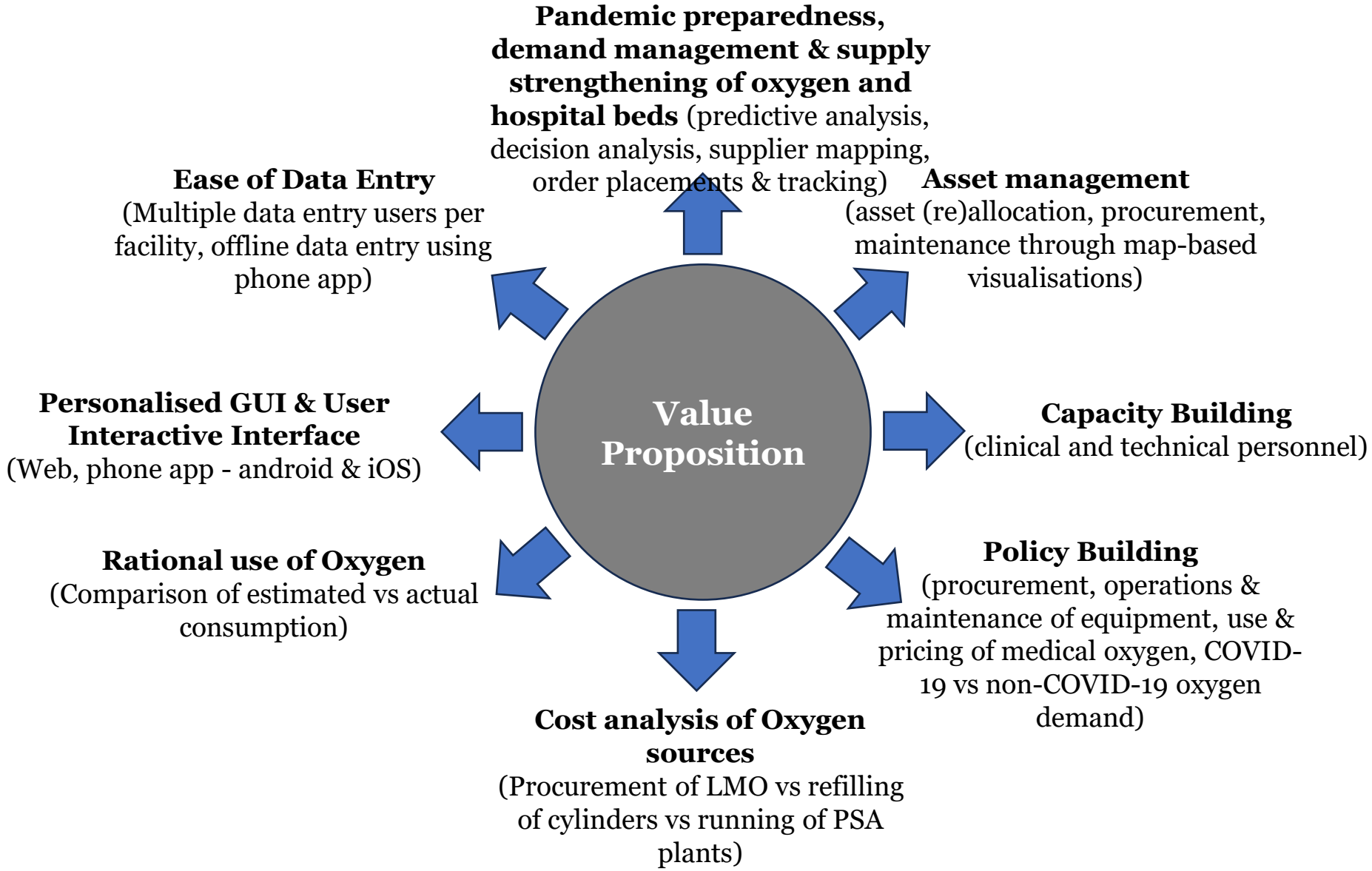
Ongoing			
Type of facility	**Uttar Pradesh**	**Karnataka**	**Madhya Pradesh**
Government Medical Colleges (GMCs)	35	24	13
District Hospitals (DHs)	108	20	51
Total	**143**	**44**	**64**

Expected in Feb 2024	
Type of facility	**Tamil Nadu**
Government Medical Colleges (GMCs)	37
District Hospitals (DHs)	29
Total	**66**

Current reach out activities:

- Reached out to the medical oxygen nodal officers in 15 other Indian states
- Presented NMOG to WHO Geneva, WHO SEARO and WHO Middle-East offices

NMOG implementation strategy – 1. Value Proposition



NMOG implementation strategy – 2. Ideal implementation timelines for a state (also applicable to a country)

Step 1 (2-4 weeks)

- OHT team engages with state's Directorate of Medical and Health Services with a request to implement NMOG.
- Request states that NMOG tool would be provided for zero-costs and based on the funds available OHT would support the implementation and uptake.

Step 2 (1 month)

- OHT team engages with state's oxygen nodal officers to modify NMOG as per local needs.

Step 3 (1 month)

- 3-6 different facility types are finalized for a one-month pilot (online & in-person capacity building activities on NMOG).
- b. This creates multiple master trainers who could be utilized for state-wide implementation.

Step 4 (1 week)

- Pilot report submitted to the government on implementation & uptake including end-user feedback on NMOG.

Step 5 (3-6 months)

- Expansion and scaling it to all tertiary care hospitals in the state, which is mostly through online, and in-person support wherever required.

Step 6 (2 months)

- Rebranding as per State's requirements, followed by handover of the NMOG to the state which is to be hosted on servers owned and managed by state IT cell or data center.

Step 7 (1 month)

- Implementation and uptake report submission

Step 8 (6-12 months)

- Support the state in implementation of NMOG in secondary and primary care hospitals.
- Provide technical support whenever required.

Going forward, focus would be on collaborations with other development partners such as WHO, PATH, CHAI, Jhpiego, etc.

NMOG implementation strategy – 3. Estimated cost implications

No.	Description of Cost	For an Indian state (USD)	For another country (USD)
1.	Procurement cost of NMOG IT platform	Free-of-charge	Free-of-charge
2.	Annual cost for hosting iOS app on the App store	$99	$99
3.	One-Time cost for hosting Android app on Google play store	$25	$25
4.	Annual estimated cost for a customised web domain name	$45	$45
5.	IT costs for translation of NMOG portal into a non-English language such as French, Spanish, Arabic, etc. (not including the translator costs)	Not applicable	Up to $5,000 per language
6.	Maintenance IT costs (only if required by the state)	Up to $10,000 per year	Up to $10,000 per year
7.	Hand holding and implementation support from OHT (remote)	Up to $2000 per month	Up to $2000 per month
8.	Hand holding and implementation support from OHT (in person)	Up to $6000 per month	Up to $8,000 per month
9.	One-Time security audit charges before the platform is hosted on state-owned data centre as mandated by IT laws and regulations	Up to $5,000	Charges as applicable by country (usually up to $5,000)
	Total Costs		
	One – Time Costs (including 6-month **[in person]** handholding by OHT team)	$41,025	$58,025
	One – Time Costs (including 6-month **[remote]** handholding by OHT team)	$17,025	$22,025
	Recurring Costs (primarily maintenance costs)	$10,144 per year	$10,144 per year

Thank You!

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