



**GLOBAL
HEALTH**
SUPPLY CHAIN SUMMIT

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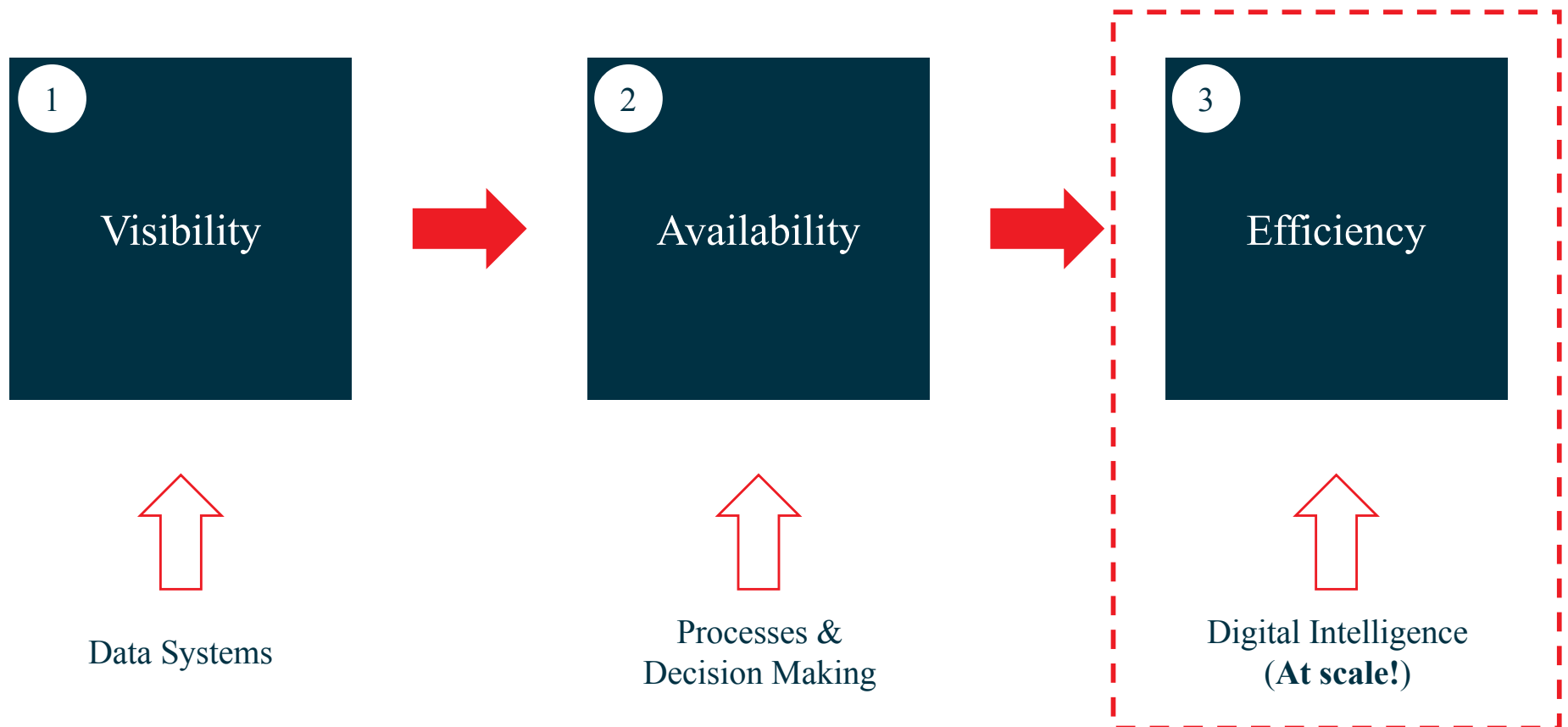


Improved demand forecasts at the last mile can save millions of dollars

Using big data and advanced analytics to drive supply chain efficiency

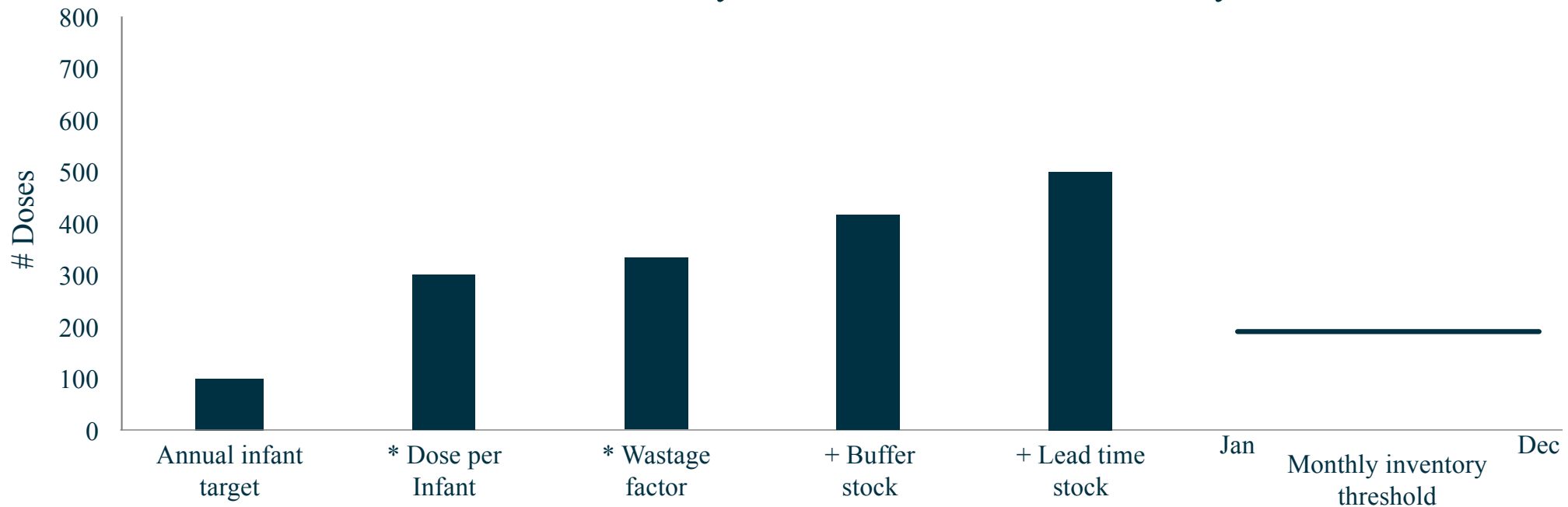
November, 2017

Over the years, the focus of health supply chains has evolved from visibility to availability and now towards efficiency



Current methods of establishing stock thresholds for vaccines are rigid and inefficient, one size fits all does not work!

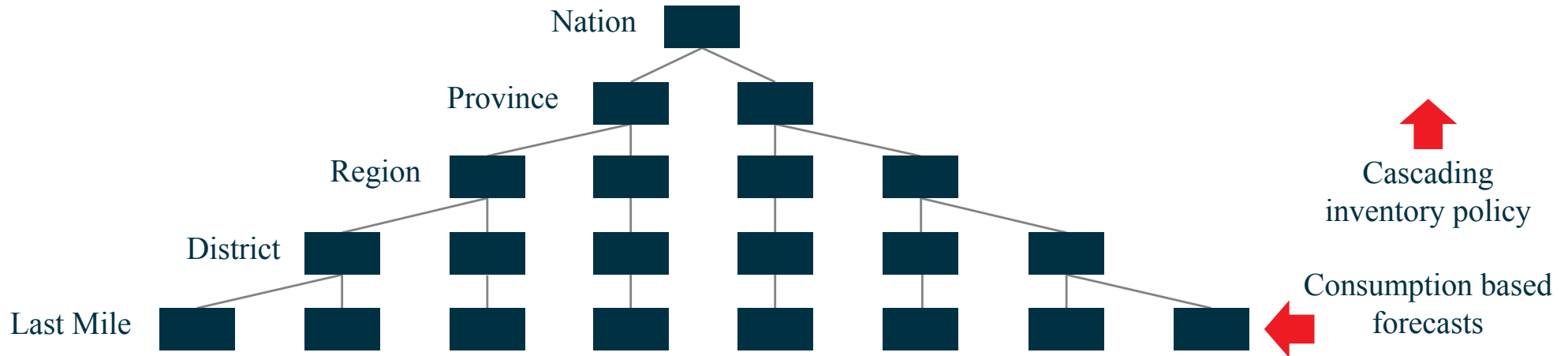
How are vaccine inventory thresholds calculated currently?



Inefficiencies

↑ Outdated & inaccurate census
 ↑ Fractional dosages
 ↑ Variability in wastage
 ↑ Variability in demand
 ↑ Proximity
 ↑ Seasonality and trends
 Effects of migration

Hypothesis: forecasting consumption based on historic demand at the last mile is superior to existing heuristic methods



Statistical models evaluated		Measures of accuracy
✓ Moving averages (3m, 6m 9m)	Holt Winters	MAPE
Moving median (3m, 6m, 9m)	Seasonal trending	MPE
ARIMA	Exponential smoothing	R^2
SARIMA	Multivariate regression	Adjusted R^2
ARIMAX	Random Forest	

Consumption based forecasts outperform heuristic methods **95%** of the time by an average of **49 pp**

The consumption based model was piloted in 1 district of a large multi echelon vaccine supply chain

Universe

374 districts in 12 provinces

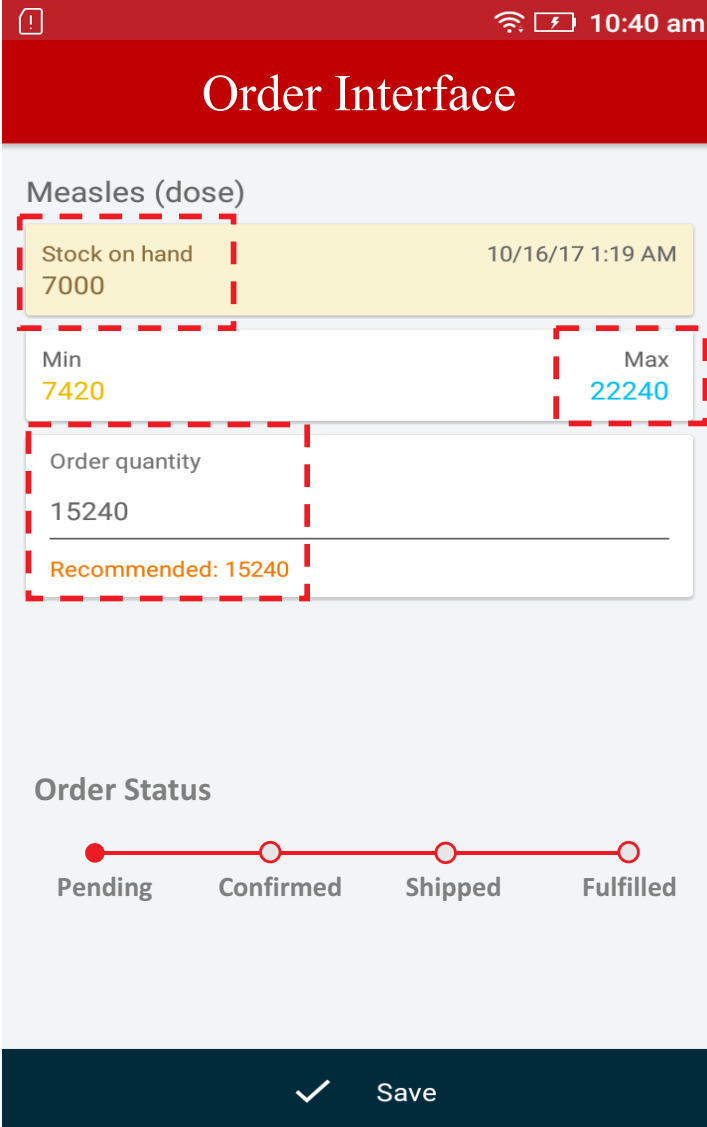


Pilot

1 district in 1 province



The pilot has been running for 4 months now, the intervention was frictionless and required no additional training



Order Interface

Measles (dose)

Stock on hand 7000 10/16/17 1:19 AM

Min 7420 Max 22240

Order quantity 15240

Recommended: 15240

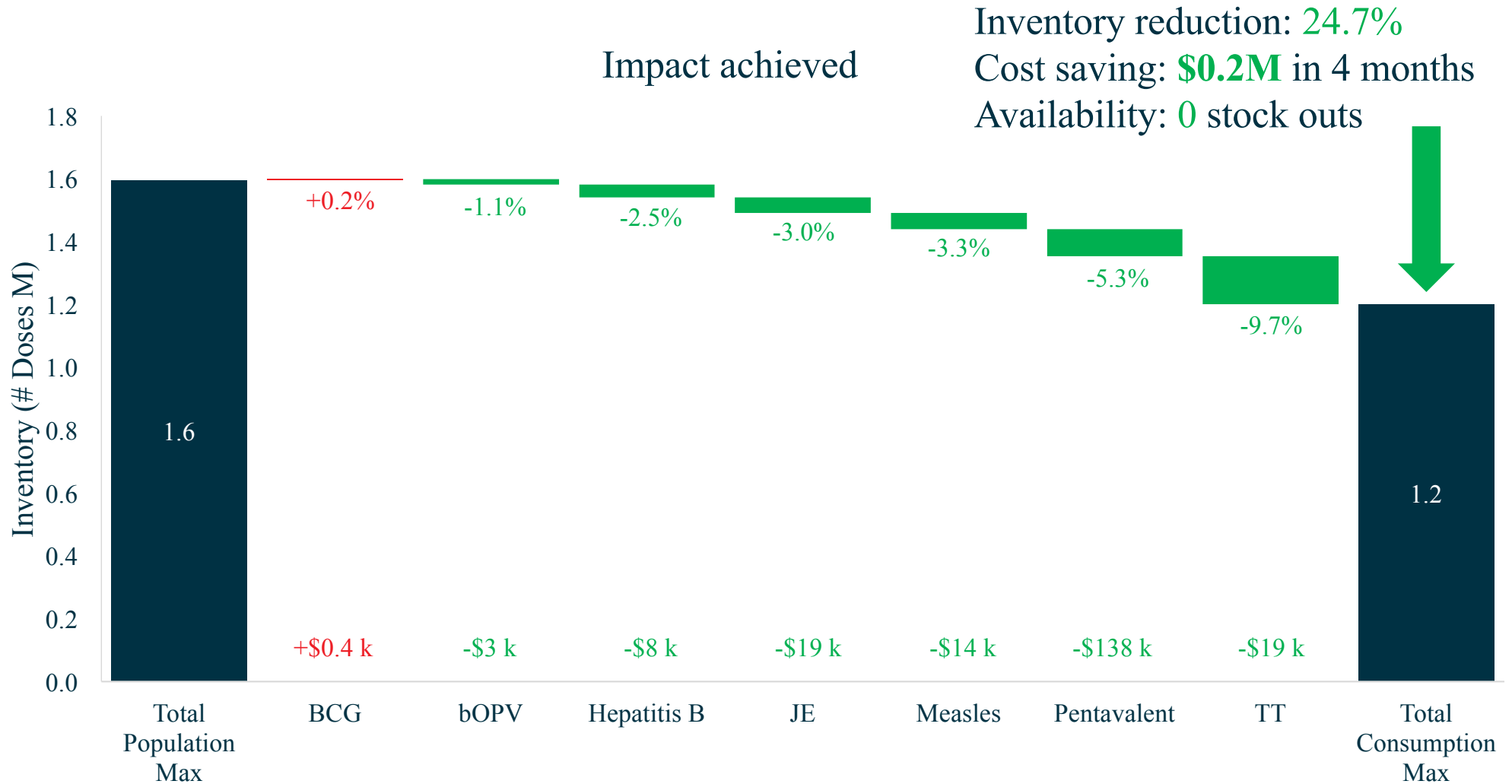
Order Status

Pending Confirmed Shipped Fulfilled

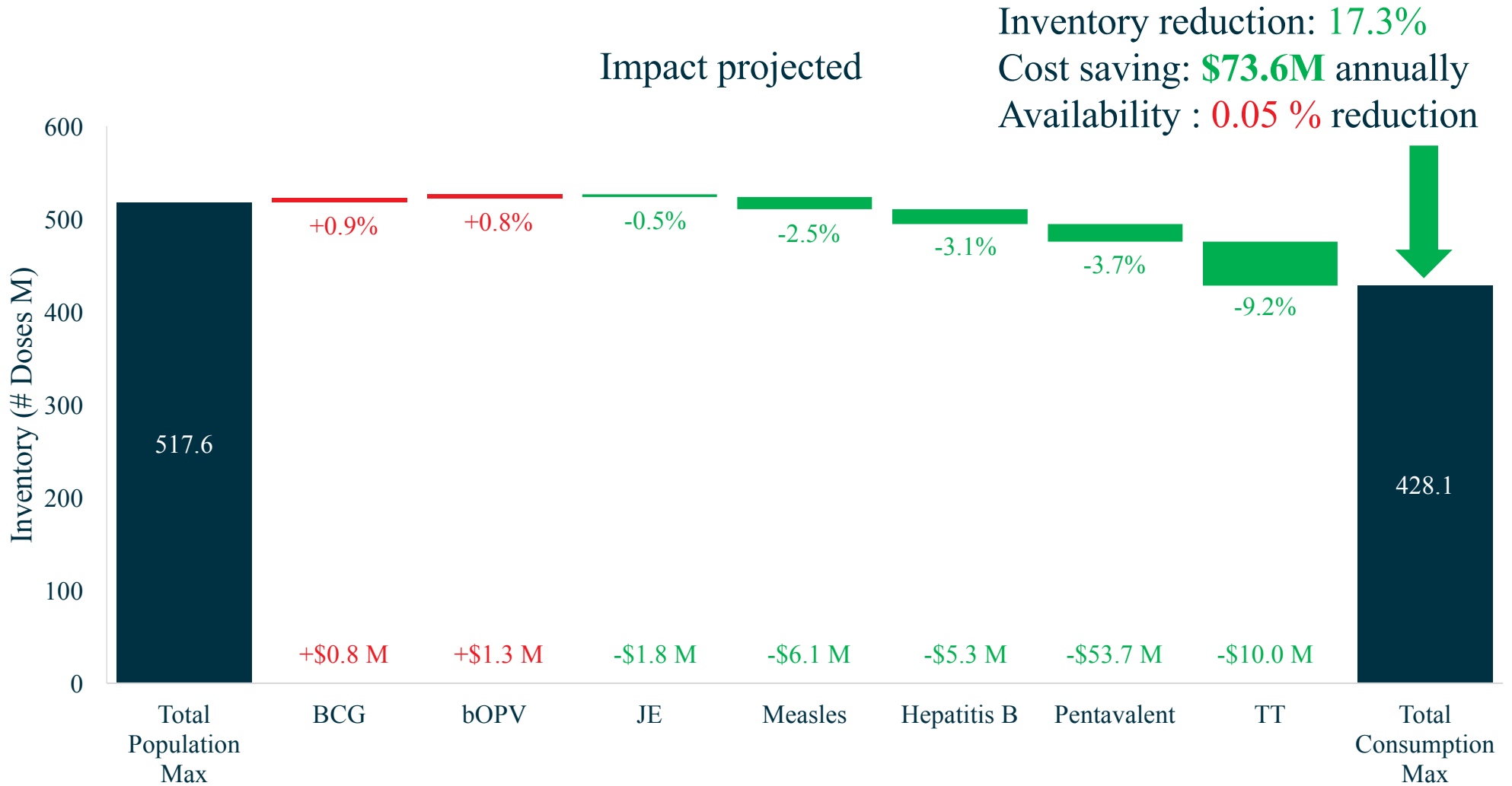
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Pilot Statistics	
Duration	4 months/ 6 months
Facilities	36/36 active
Users	36/36 active
SKUs	11/11 active
Echelons	4/4 active
Orders	2,090 SKUs till date
Doses	6.3M doses till date

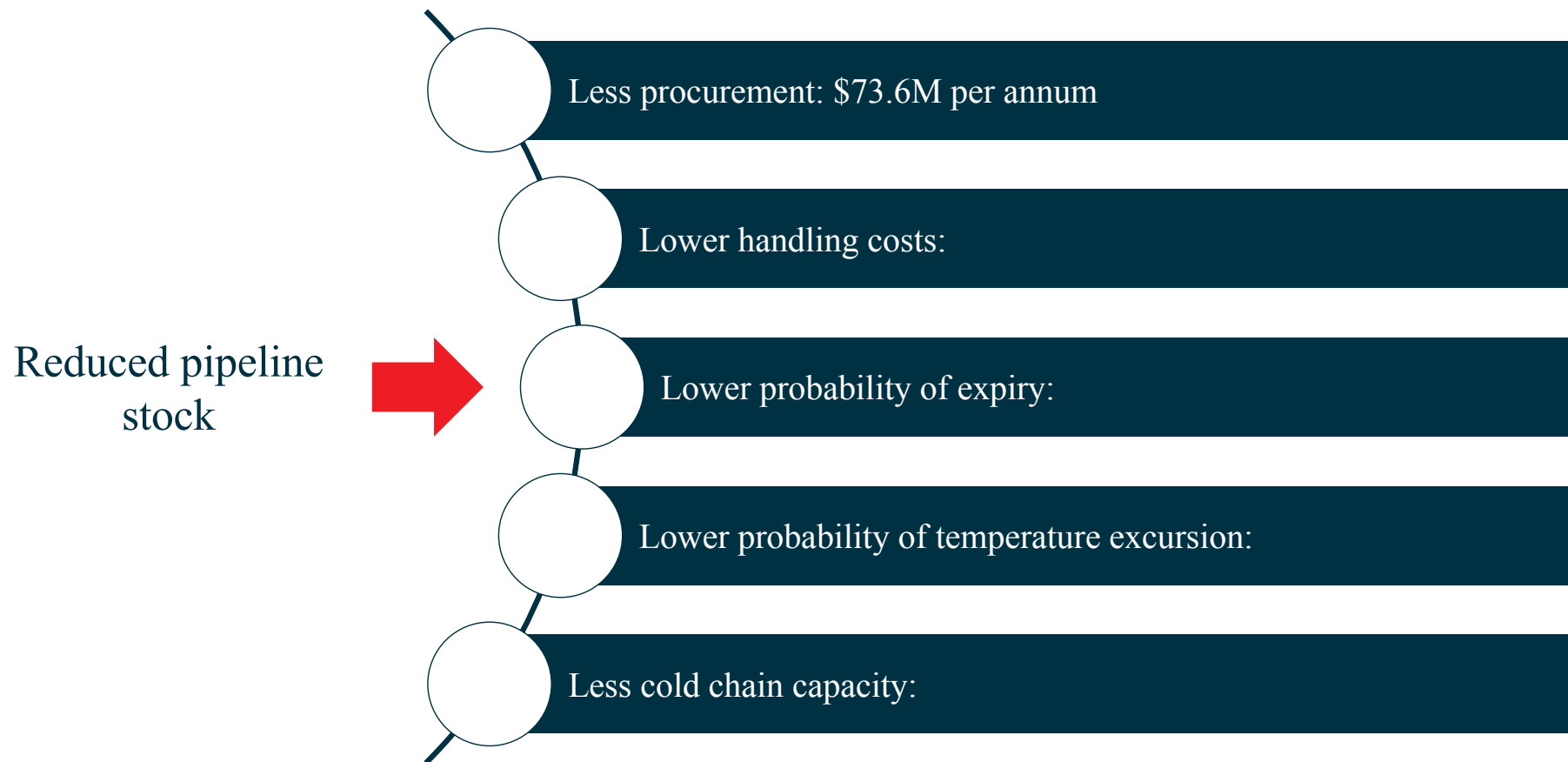
In the pilot, inventory reduced by 24.7% (\$0.2M cost savings over 4 months) and caused 0 stock outs in the same period



Once scaled, inventory will reduce by 17.3% thereby saving \$73.6M annually, reducing availability by just 0.05 %



Minimizing the time duration materials spend in the pipeline is the single most effective way of lowering total supply chain cost



Conclusion

Simple forecasts can save **>200M\$** annually in the vaccine supply chain of just one country

Implementing the forecasts is a **frictionless change**

The underlying technology, methodology and insights can be applied to practically **any health commodity**

The 3 month moving average method (adjusted for stock out days) was chosen as it was accurate and also easily explainable

Sample 3 month moving average based forecasts

