



S&T Roadmap for Disaster Risk Reduction and Climate Change Adaptation (DRR-CCA)

CY 2021-2028



Disaster Risk Reduction (Tsunami Hazard)

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Done	Ongoing	Not yet Available
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OVERALL STRATEGIES

a. Human Resource

- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Increase and availability of experts.
- Capacity Building and Training for stakeholders and beneficiaries.
- Partnership with LGUs for community-based warnings
- Trained human resource on integrating tsunami hazard information in DRR plans at the local levels

b. R&D Technologies

- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services

- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies

- Dialogue and coordination with LGUs and policy makers for concrete applications.

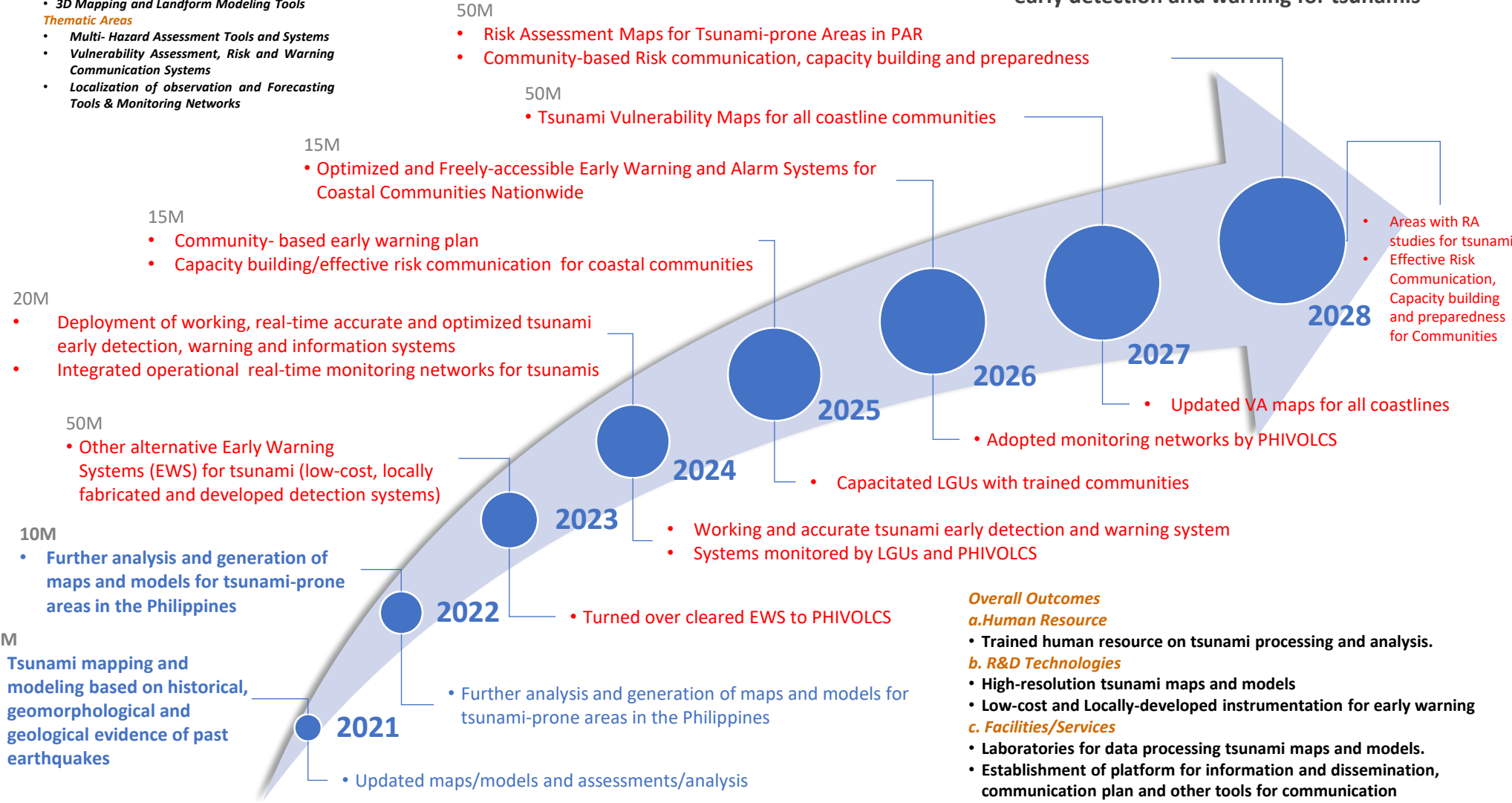
NAST Foresight

- Remote Sensing and GIS-aided Precision Tools
- Online Real-time Monitoring and Information Systems/Networks
- 3D Mapping and Landform Modeling Tools

Thematic Areas

- Multi-Hazard Assessment Tools and Systems
- Vulnerability Assessment, Risk and Warning Communication Systems
- Localization of observation and Forecasting Tools & Monitoring Networks

Possible Solutions



Vision

- Collated readily-accessible maps and models for most vulnerable and high-risk areas capable of early detection and warning for tsunamis

Milestones

Overall Outcomes

- a. Human Resource**
 - Trained human resource on tsunami processing and analysis.
- b. R&D Technologies**
 - High-resolution tsunami maps and models
 - Low-cost and Locally-developed instrumentation for early warning
- c. Facilities/Services**
 - Laboratories for data processing tsunami maps and models.
 - Establishment of platform for information and dissemination, communication plan and other tools for communication
- d. S&T Policies**
 - Policy recommendation to LGUs in tsunami-prone areas and PHIVOLCS as the mandated agency.

Disaster Risk Reduction (Earthquake Hazard)

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OVERALL STRATEGIES

a. Human Resource

- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Increase and availability of experts.
- Capacity Building and Training for stakeholders and beneficiaries.
- Partnership with LGUs for community-based warnings
- Trained human resource on integrating earthquake hazard information in DRR plans at the local levels

b. R&D Technologies

- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services

- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies

- Dialogue and coordination with LGUs and policy makers for concrete applications.

NAST Foresight

- Remote Sensing and GIS-aided Precision Tools
- Online Real-time Monitoring and Information Systems/Networks
- 3D Mapping and Landform Modeling Tools

Thematic Areas

- Multi-Hazard Assessment Tools and Systems
- Vulnerability Assessment, Risk and Warning Communication Systems
- Localization of observation and Forecasting Tools & Monitoring Networks

Possible Solutions

20M

- Community-based Risk communication, capacity building and preparedness

30M

- Post-earthquake fire assessment (ex. fire as a secondary hazard resulting from earthquakes)
- Old edifices/ culturally important infrastructures damaged by earthquakes (vulnerability and propose immediate interventions)

15M

- Risk Assessment Maps for Earthquake-prone Areas

15M

- Earthquake Vulnerability Maps for the Philippines

100M

- Updating of Exposure Data Maps all over the Philippines
- Translation of earthquake-related vector data from the 1970s to digital files
- Additional reference for earthquakes historical data digital files

15M

- Nationwide Earthquake hazard Mapping and Modeling thru Alternative Methods

10M

- Updating of Earthquake Projections through new and faster alternative techniques (including onshore and offshore mapping in PAR)

10M

- Updating of nationwide Earthquake Hazard Map (Onshore and pre-identified Offshore areas)

2021

- Updated nationwide Earthquake Hazard Maps

- Updated nationwide Earthquake Projections

- Faster Nationwide Earthquake Hazard Mapping

2022

- Updated Exposure maps for the Philippines
- Modeling earthquake Hazards from new and historical data

2023

- Updated VA maps

2024

- Updated RA maps

2025

- Effective Risk Communication, Capacity building and preparedness for Communities

2027

- Identification and Assessment of secondary hazards resulting from earthquakes

2026

2028

Vision

- Collated readily-accessible maps and models for most vulnerable and high-risk areas to earthquakes

Milestones

Overall Outcomes

a. Human Resource

- Trained human resource on tsunami processing and analysis.

b. R&D Technologies

- High-resolution tsunami maps and models
- Low-cost and Locally-developed instrumentation for early warning

c. Facilities/Services

- Laboratories for data processing tsunami maps and models.
- Establishment of platform for information and dissemination, communication plan and other tools for communication

d. S&T Policies

- Policy recommendation to LGUs in tsunami-prone areas and PHIVOLCS as the mandated agency.

Disaster Risk Reduction *(Volcanic Hazard)*

OVERALL STRATEGIES

a. Human Resource

- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Increase and availability of experts.
- Capacity Building and Training for stakeholders and beneficiaries.
- Partnership with LGUs for community-based warnings
- Trained human resource on integrating volcanic hazard information in DRR plans at the local levels

b. R&D Technologies

- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services

- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies

- Dialogue and coordination with LGUs and policy makers for concrete applications.

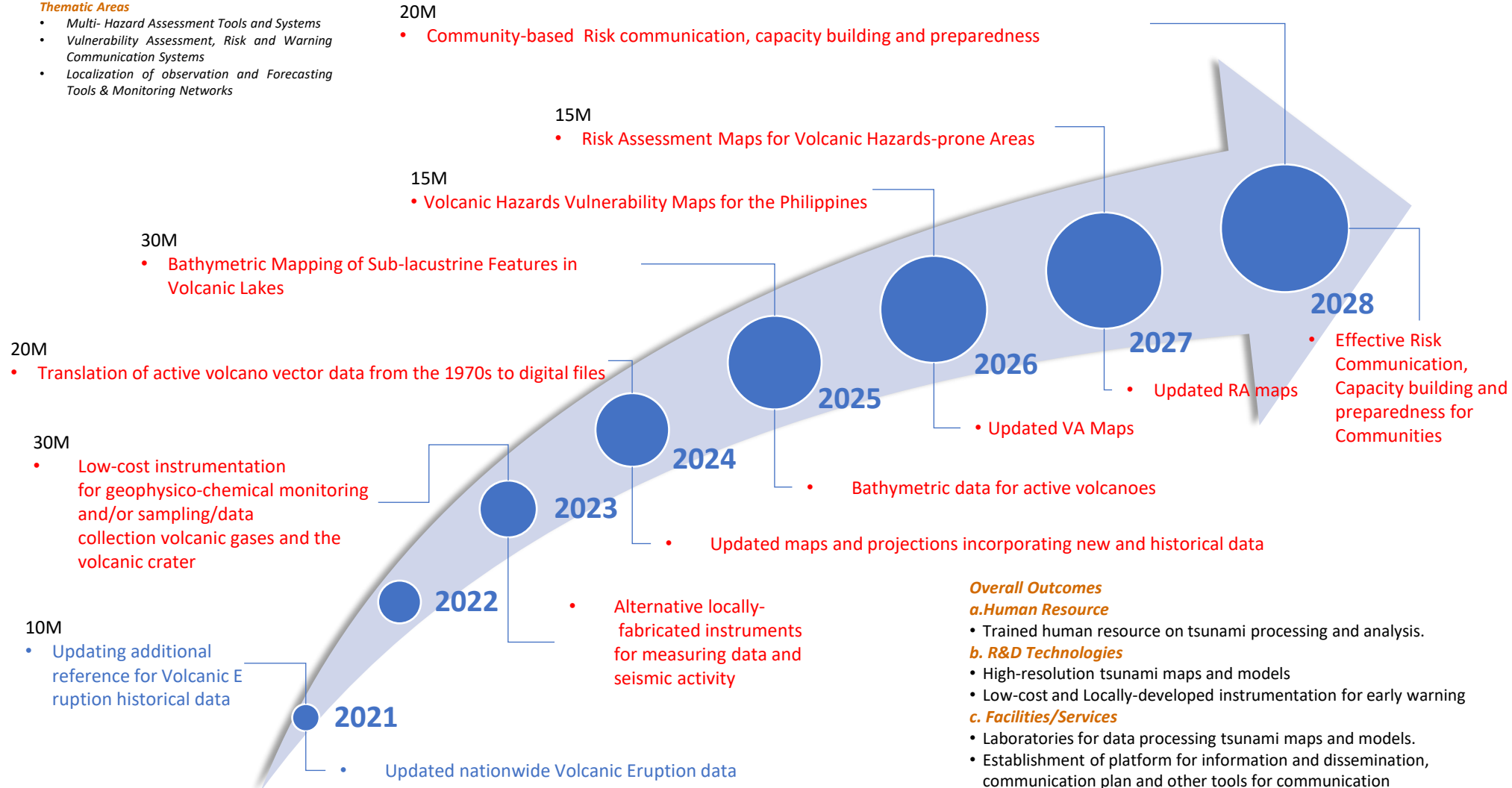
NAST Foresight

- Remote Sensing and GIS-aided Precision Tools
- Online Real-time Monitoring and Information Systems/Networks
- 3D Mapping and Landform Modeling Tools

Thematic Areas

- Multi-Hazard Assessment Tools and Systems
- Vulnerability Assessment, Risk and Warning Communication Systems
- Localization of observation and Forecasting Tools & Monitoring Networks

Possible Solutions



Vision

- Collated readily-accessible maps and models for most vulnerable and high-risk areas capable of early detection and warning for volcanic hazards

Milestones

Overall Outcomes

a. Human Resource

- Trained human resource on tsunami processing and analysis.

b. R&D Technologies

- High-resolution tsunami maps and models
- Low-cost and Locally-developed instrumentation for early warning

c. Facilities/Services

- Laboratories for data processing tsunami maps and models.
- Establishment of platform for information and dissemination, communication plan and other tools for communication

d. S&T Policies

- Policy recommendation to LGUs in tsunami-prone areas and PHIVOLCS as the mandated agency.

Disaster Risk Reduction (Landslide Hazard)

OVERALL STRATEGIES

a. Human Resource

- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Increase and availability of experts.
- Capacity Building and Training for stakeholders and beneficiaries.
- Partnership with LGUs for community-based warnings
- Trained human resource on integrating landslide hazard information in DRR plans at the local levels

b. R&D Technologies

- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services

- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies

- Dialogue and coordination with LGUs and policy makers for concrete applications.

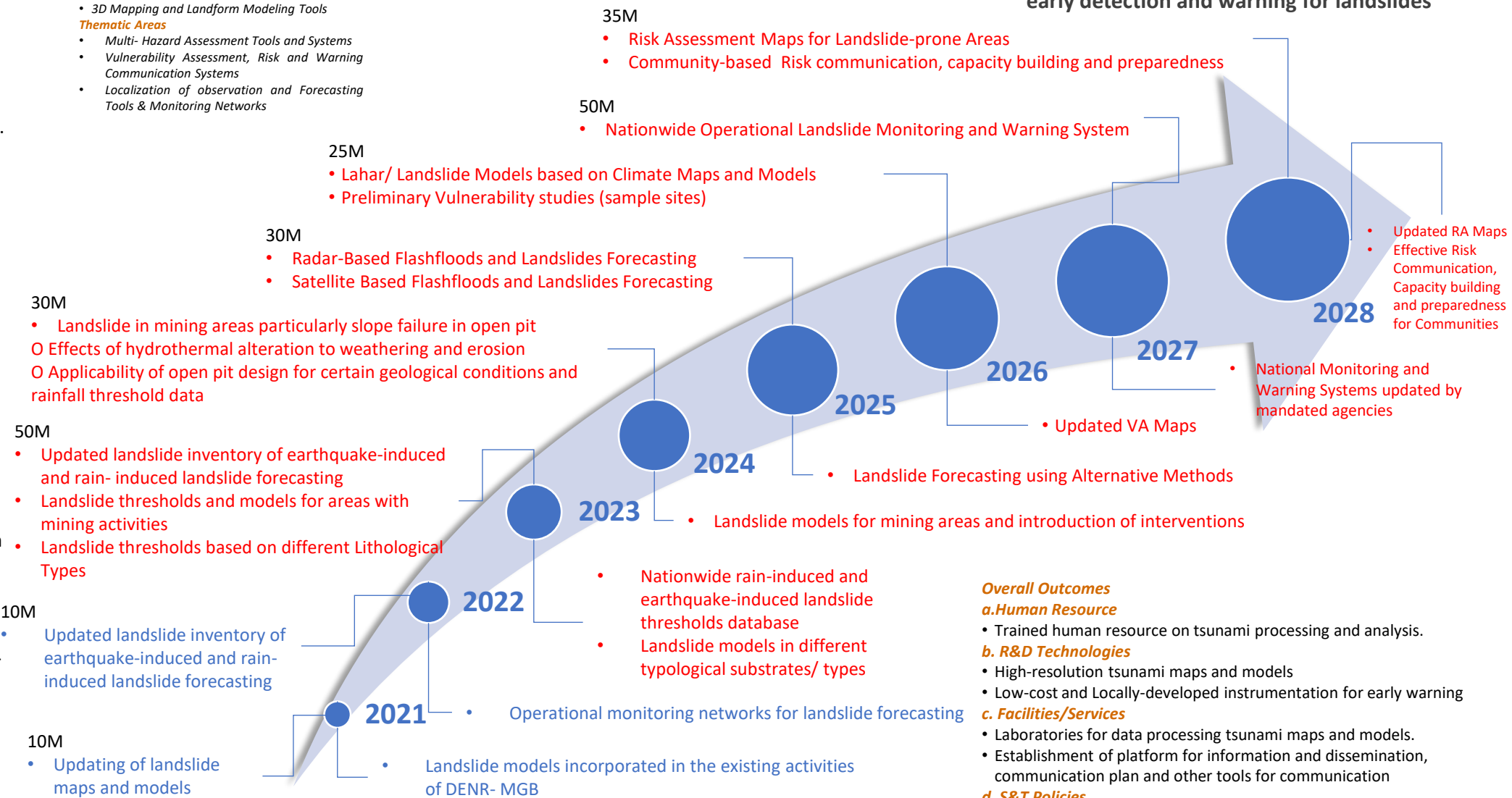
NAST Foresight

- Remote Sensing and GIS-aided Precision Tools
- Online Real-time Monitoring and Information Systems/Networks
- 3D Mapping and Landform Modeling Tools

Thematic Areas

- Multi-Hazard Assessment Tools and Systems
- Vulnerability Assessment, Risk and Warning Communication Systems
- Localization of observation and Forecasting Tools & Monitoring Networks

Possible Solutions



Vision

- Collated readily-accessible maps and models for most vulnerable and high-risk areas capable of early detection and warning for landslides

Milestones

Overall Outcomes

a. Human Resource

- Trained human resource on tsunami processing and analysis.

b. R&D Technologies

- High-resolution tsunami maps and models
- Low-cost and Locally-developed instrumentation for early warning

c. Facilities/Services

- Laboratories for data processing tsunami maps and models.
- Establishment of platform for information and dissemination, communication plan and other tools for communication

d. S&T Policies

- Policy recommendation to LGUs in tsunami-prone areas and PHIVOLCS as the mandated agency.

Disaster Risk Reduction *(Tropical Cyclone Hazard)*

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OVERALL STRATEGIES

a. Human Resource

- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Increase and availability of experts.
- Capacity Building and Training for stakeholders and beneficiaries.
- Partnership with LGUs for community-based warnings
- Trained human resource on integrating tropical cyclone hazard information in DRR plans at the local levels

b. R&D Technologies

- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services

- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies

- Dialogue and coordination with LGUs and policy makers for concrete applications.

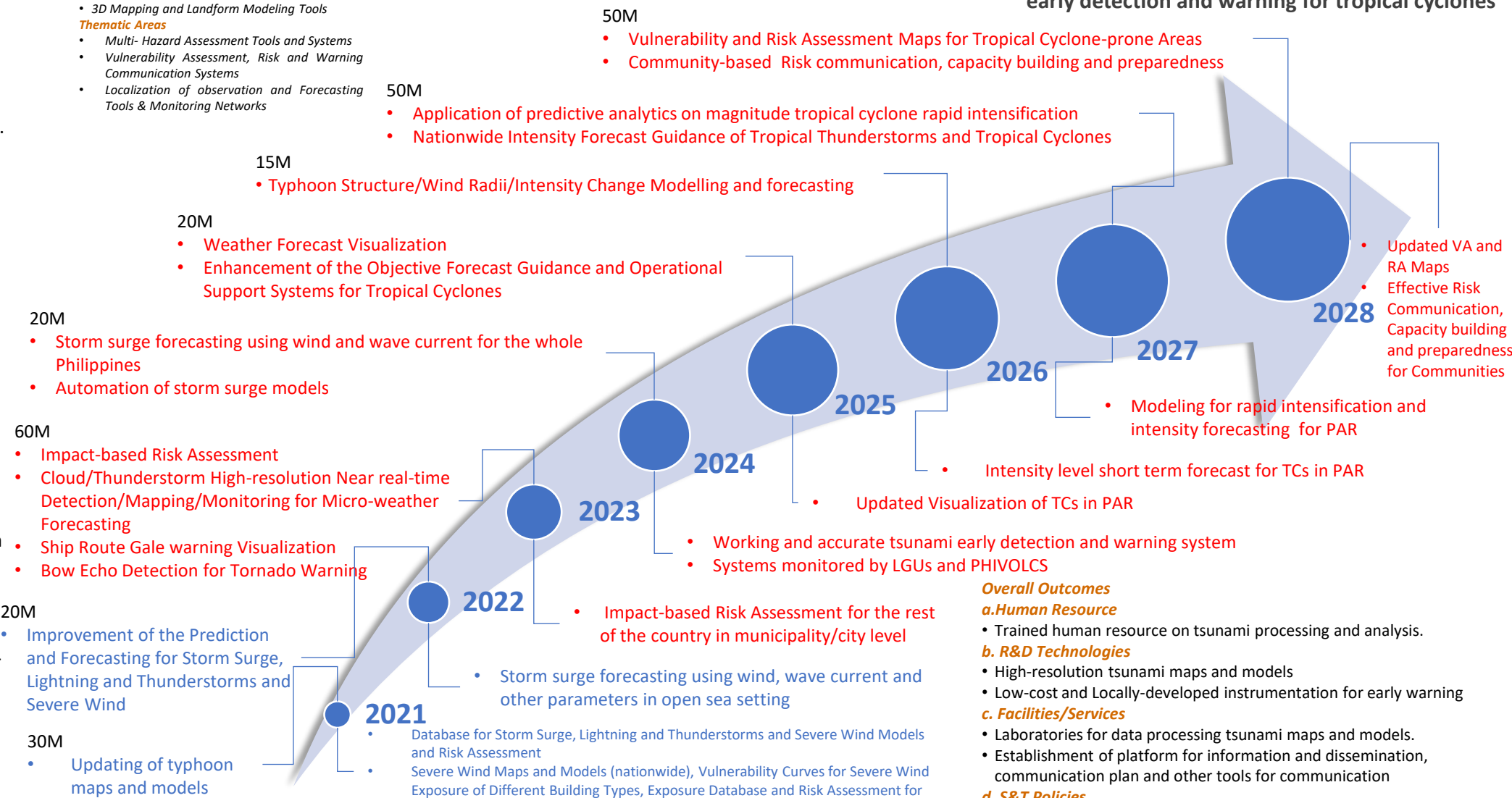
NAST Foresight

- Remote Sensing and GIS-aided Precision Tools
- Online Real-time Monitoring and Information Systems/Networks
- 3D Mapping and Landform Modeling Tools

Thematic Areas

- Multi-Hazard Assessment Tools and Systems
- Vulnerability Assessment, Risk and Warning Communication Systems
- Localization of observation and Forecasting Tools & Monitoring Networks

Possible Solutions



Vision

- Collated readily-accessible maps and models for most vulnerable and high-risk areas capable of early detection and warning for tropical cyclones

Overall Outcomes

a. Human Resource

- Trained human resource on tsunami processing and analysis.

b. R&D Technologies

- High-resolution tsunami maps and models
- Low-cost and Locally-developed instrumentation for early warning

c. Facilities/Services

- Laboratories for data processing tsunami maps and models.
- Establishment of platform for information and dissemination, communication plan and other tools for communication

d. S&T Policies

- Policy recommendation to LGUs in tsunami-prone areas and PHIVOLCS as the mandated agency.

Milestones

Disaster Risk Reduction (Floods and Heavy Rains Hazard)

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OVERALL STRATEGIES

a. Human Resource

- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Increase and availability of experts.
- Capacity Building and Training for stakeholders and beneficiaries.
- Partnership with LGUs for community-based warnings
- Trained human resource on integrating floods and heavy rains hazard information in DRR plans at the local levels

b. R&D Technologies

- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services

- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies

- Dialogue and coordination with LGUs and policy makers for concrete applications.

NAST Foresight

- Remote Sensing and GIS-aided Precision Tools
- Online Real-time Monitoring and Information Systems/Networks
- 3D Mapping and Landform Modeling Tools

Thematic Areas

- Multi-Hazard Assessment Tools and Systems
- Vulnerability Assessment, Risk and Warning Communication Systems
- Localization of observation and Forecasting Tools & Monitoring Networks

Possible Solutions

50M

- Nationwide Vulnerability and Risk Assessment Studies for Urban and River Flooding-prone Areas
- Community-based Risk communication, capacity building and preparedness

20M

- Flood Vulnerability and Risk Assessments for critical Coastal Areas
 - o Land subsidence
 - o Urban/river flooding

25M

- Strengthening Nowcasting of Thunderstorm and Heavy Rainfall (Radar, QPE, QPF, MCS)
- Application of Artificial Intelligence (AI) in Weather Forecasting

25M

- Advanced Space Technology for Real-Time Flood Monitoring; Internet of Things (IoT) Approach and Cloud Computing in Flood Forecasting
- Sedimentological and geomorphological approach in flood hazard models: Identifying recurrence pattern using direct evidence

30M

- Flood Forecasting & Early Warning using Advance Technology (Radar, Satellite, High Resolution Modelling and others)
- Convective Scale Modelling and Ensembled Forecasting

30M

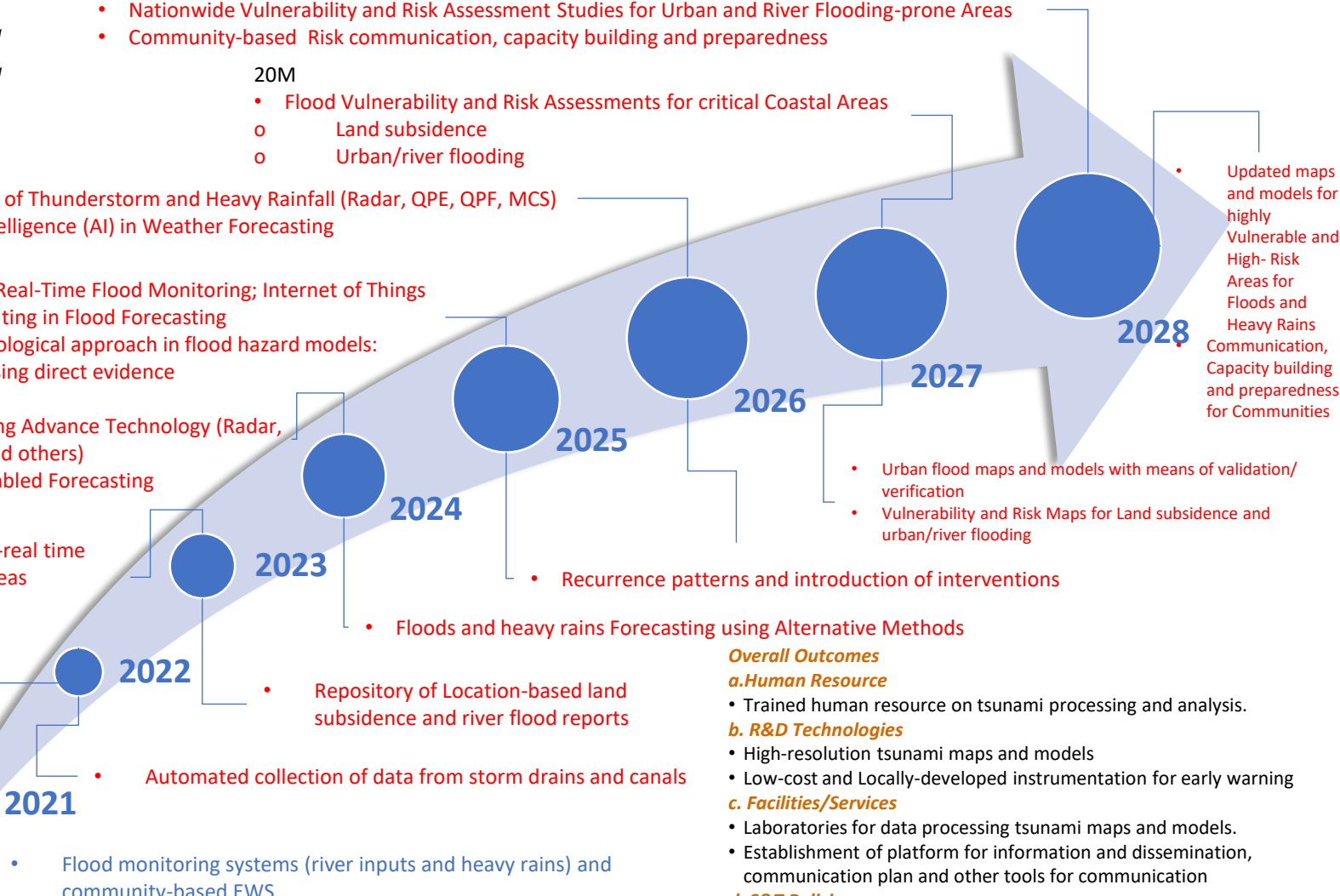
- Community or Barangay Level Near-real time Flood Forecasting for Vulnerable Areas
 - o Land subsidence
 - o Urban/river flooding

40M

- Intelligent storm drain/canal sensors and/or systems
- Street level/ barangay level/ community level near-real time river monitoring and early warning system for all rivers nationwide
- Municipality/ City Level Early Warning Forecasting for Floods

20M

- Updating of flood maps and models



Milestones

Vision

- Collated readily-accessible maps and models for most vulnerable and high-risk areas capable of early detection and warning for floods and heavy rains

Overall Outcomes

a. Human Resource

- Trained human resource on tsunami processing and analysis.

b. R&D Technologies

- High-resolution tsunami maps and models
- Low-cost and Locally-developed instrumentation for early warning

c. Facilities/Services

- Laboratories for data processing tsunami maps and models.
- Establishment of platform for information and dissemination, communication plan and other tools for communication

d. S&T Policies

- Policy recommendation to LGUs in tsunami-prone areas and PHIVOLCS as the mandated agency.

Climate Change Adaptation (Climate Change-related Hazards)

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Vision

- Collated readily-accessible maps and models for most vulnerable and high-risk areas capable of early detection and warning for climate change-related hazards

OVERALL STRATEGIES

a. Human Resource

- Training human resource in the analysis of multi-natural hazard mapping and modeling for seismic and hydro-geologic hazards.
- Increase and availability of experts.
- Capacity Building and Training for stakeholders and beneficiaries.
- Partnership with LGUs for community-based warnings
- Trained human resource on integrating climate change-related hazard information in DRR plans at the local levels

b. R&D Technologies

- Maintenance and updating of data platforms.
- Establishment of accurate and precise early warning systems for multi-natural hazards.
- Updating Vulnerability and Risk Maps.
- Operationalization of outputs from the stakeholders by the mandated agencies.

c. Facilities and Services

- Establishment of GIS and remote sensing processing laboratories for big data analytics.

d. S&T Policies

- Dialogue and coordination with LGUs and policy makers for concrete applications.

NAST Foresight

- Remote Sensing and GIS-aided Precision Tools
- Online Real-time Monitoring and Information Systems/Networks
- 3D Mapping and Landform Modeling Tools

Thematic Areas

- Multi-Hazard Assessment Tools and Systems
- Vulnerability Assessment, Risk and Warning Communication Systems
- Localization of observation and Forecasting Tools & Monitoring Networks

Possible Solutions

100M

- Space Weather Monitoring System
- Common Monitoring and Evaluation of Climate Actions in the Philippines
- Nationwide Vulnerability and Risk Assessment Studies for Extreme Weather Phenomena, Temperature Extremes or Sea Level Rise/Flooding
- Community-based Risk communication, capacity building and preparedness

50M

- User Interface platforms (UIPs) for Communicating Weather, Flood, and Climate Risks
- Socio-Economic Valuation of Meteorological Products and Services
- Loss and Damage related to Climate Change events
- Climate Change Scenarios : Top Most Vulnerable Provinces in the Philippines

15M

- Multi-scale monitoring and prediction of climate extremes

100M

- Subsidence hazards - Engineering geology and geotechnical applications and monitoring system for karst subsidence
- Green spaces in major urban centers
- Interventions to reduce 75% greenhouse gases emissions (as part of the National Commitment)

50M

- Sectoral impacts and risk assessment of possible changes in rainfall, temperature, wind, humidity, and other meteorological elements-Convective Scale Modelling and Ensembled Forecasting
- Ocean Forecast System for Marine Activities
- Groundwater Resource - Groundwater management subsector

50M

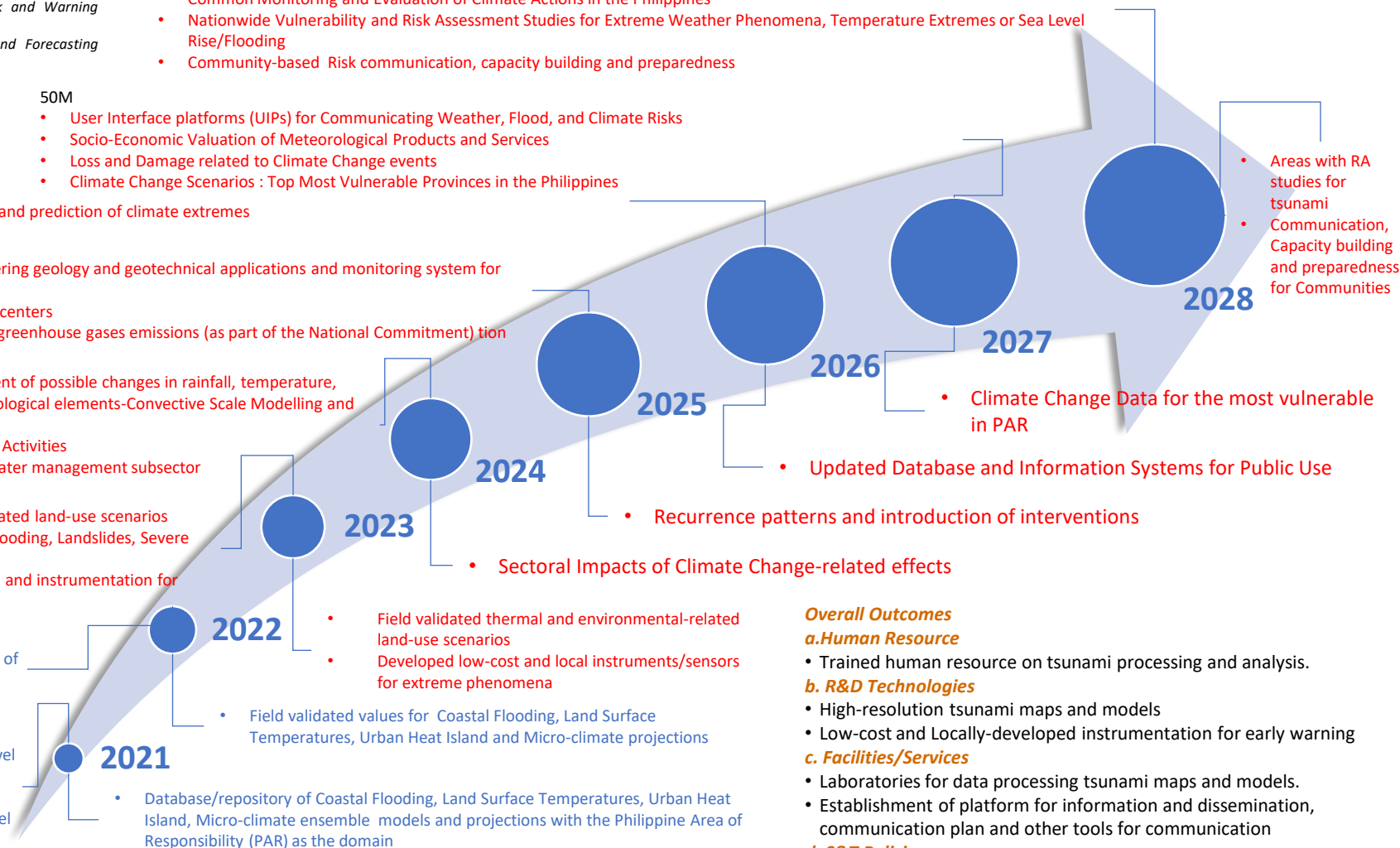
- Thermal and environmental-related land-use scenarios
- Impact-based Forecasting for Flooding, Landslides, Severe Wind and Storm Surge
- Mapping, modeling/projections and instrumentation for extreme phenomena

20M

- Means of Verification and validation of the projections for coastal flooding projections

30M

- Coastal flooding projections from sea-level rise (in meters)
- Land Surface Temperatures, Urban Heat Island and Micro-climate ensemble model and projections



Milestones

Overall Outcomes

a. Human Resource

- Trained human resource on tsunami processing and analysis.

b. R&D Technologies

- High-resolution tsunami maps and models
- Low-cost and Locally-developed instrumentation for early warning

c. Facilities/Services

- Laboratories for data processing tsunami maps and models.
- Establishment of platform for information and dissemination, communication plan and other tools for communication

d. S&T Policies

- Policy recommendation to LGUs in tsunami-prone areas and PHIVOLCS as the mandated agency.