



bushfire&natural  
**HAZARDS**CRC

# NATURAL HAZARD EXPOSURE INFORMATION FRAMEWORK

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Australian Government  
Department of Industry and Science

**Business**  
Cooperative Research  
Centres Programme



Australian Government  
Geoscience Australia



UNIVERSITY OF  
CANBERRA



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MELBOURNE

# PROJECT TEAM

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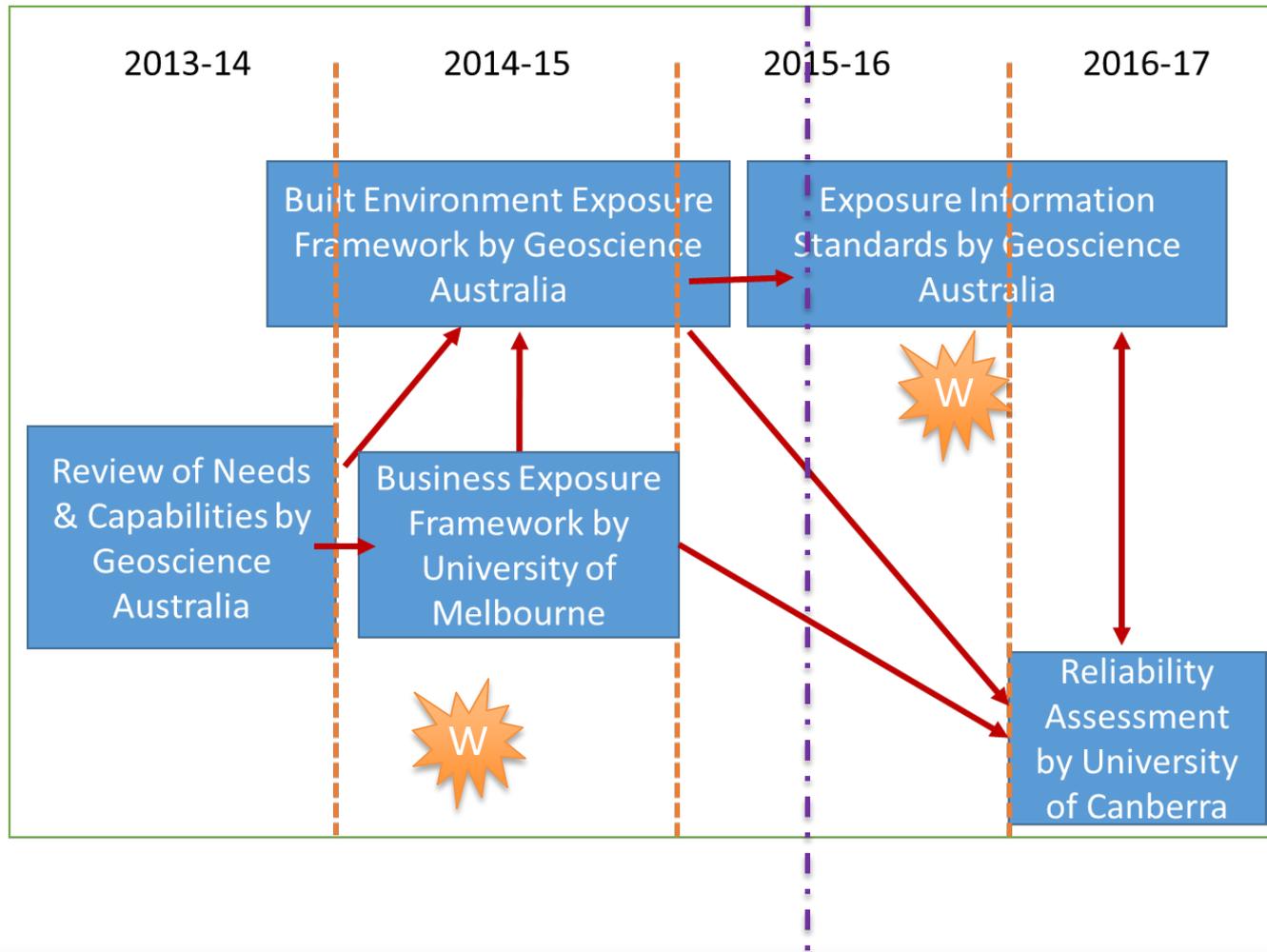
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# RESEARCH OBJECTIVE

To develop a nationally consistent exposure information framework that *enables more robust, reliable and operational* capabilities to address disaster preparedness, planning, response and recovery for all levels of government (local, state and federal), industry and research.

# PROJECT TIMELINES & STATUS



# MILESTONES PROGRESS

Literature Review - Completed

Existing Capabilities Review (Online Survey) – Completed

Stakeholders Workshop - Completed

Business Exposure Elements Framework – Delayed

Built Environment Exposure Elements Framework – Completed

Development of Standards – Progressing

Reliability Framework – 2016/17

# Australian Natural Hazards Exposure Framework

## ANHEF Level 1

- 1) Federal & State Government Decision Making
- 2) Policy & Planning Purpose
- 3) Able to Aggregate to SA2 or larger geographic areas.

## ANHEF Level 2

- 1) State & Local Government & Insurance Sector Decision Making
- 2) Planning & Implementation Purpose
- 3) Able to Aggregate to Meshblocks or a building level.

## ANHEF Level 3

- 1) Local Government, Researchers & Insurance Sector
- 2) Response & Research Purpose
- 3) Asset level with details
- 4) Privacy & Commercial-in-Confidence.



**BUILDINGS**

**INFRASTRUCTURE**

**POPULATION**

**BUSINESS**

# Exposure Information Elements

FUNDAMENTAL INFORMATION			
Location	Land Use	Insurance Status	Metadata
Latitude Longitude Address Geometry - Point - Line - Area	Urban (ABS)  Rural (ALUM Classification)	<b>PERSONAL</b> Life Insurance Income Protection Insurance Health Insurance Motor Insurance Travel Insurance <b>HOUSEHOLDS</b> Buildings Insurance Contents Insurance <b>BUSINESS</b> Worker's Compensation Professional Indemnity Insurance Liability Insurance <b>GOVERNMENT</b> State Owned Assets Flood Cover Insurance Malevolent Cover Insurance Compulsory Third Party Motor Public Liability Insurance <b>INSURANCE COMPANIES</b> Re-insurance	Keywords Geometry Feature Type Definition Data Source Spatial Accuracy Attribute Reliability Attribute Source Attribute Accuracy Data Currency Maintenance Cycle Revision Date Limitations Restrictions Contacts

# Exposure Information Elements

BUILDINGS INFORMATION							
Usage	Type	Structure System	Year Built	Size	Emergency Exit	Utility Connections	Replacement Value
Residential Commercial Light Indust. Educational Health & Welfare Emergency-Services Government Community Recreational Mixed Use	Separate H Semi-detached H Apartment -Low Rise -Medium Rise -High Rise -Multistorey Commercial Shopping Mall Complex Agric. Sheds Warehouse Light Indust. Heavy Indust. Parking Struct. Religious Monuments/Heritage MultipleBldg Public Venues	Foundation Internal Frame External Wall Façade Coverage Roof Shape Roof Type Orientation Floor Type Floor Height # of Storeys # of Basements Attachments Building Standard Emergency Exit Utility Source	Built Year Construction Period Retrofit Year Renovation Year	Land size Gross Floor Area Building Lettable Area Number of Dwellings Extensions Bedrooms Toilets Car Parks Annex buildings	Signage Evacuation Floors Evacuation Lifts Evacuation Stairwells Evacuation Plan Code Regulations Problems	Location of - Gas - Electricity - Water - Solar - Hydrants	Building Value Contents Value

# Exposure Information Elements

TRANSPORT INFRASTRUCTURE .....					
Roadway	Railway	Waterway	Bridges/ Culverts	Tunnels	Airports
Type Constr. Material Carrying Cap Cap Utilization Year Upgraded Lane Width Shoulder Width Grade/Condition Bicycle Paths/ Footpaths Reconstr. Cost	Type Gauge Usage Control Facilities Rail Gates Train/Tram Condition Electrification Capacity Year built Year Upgraded Reconstr. Cost	Channel - Width - Depth - Purpose Harbours Wharves Sea Ferry Networks	Length Width Type Structure Type Design Spans Materials Purpose Capacity Year built Pier walls Abutment Reconstr. Cost	Usage Length Width Type Structure Shape Materials Purpose Equipment Year Built Capacity Reconstr. Cost	Functional Type LandingGround Traffic Control TowerSystems WeatherStation Safety Facility Security Fuel Depo Terminals Gates Customs Office Immigration Hangers Year Capacity Traffic Pattern Reconstr. Cost

# Exposure Information Elements

TRANSPORT INFRASTRUCTURE .....				
Sea Ports	Public Transport	Multimodal	Vehicles	Functions
Port Name Port Type Berthing Structures Platform Type Protection Barriers Super-Structures Capacity Year Connections Protection Facilities Reconstr. Cost	Terminals Interchange Bus stops Railway Station Railway Yards Control Rooms Harbours	Connections Containers Cranes Stackers Trucks Barges Ships Planes Control Rooms Capacity Value	Number & Types - Aircrafts - Helicopter - Cargo - Buses - Trucks - Cars - Motor Cycles - Trains - Trams - Boats - Ferry - Ships	Schedules Routes Patterns Dependencies Capacity

# Exposure Information Elements

ENERGY INFRASTRUCTURE .....						
Petroleum Wells	Petroleum Refinery	Petroleum Terminals	Petroleum Transmission	Gas Processing	Gas Transmission	Gas Storage
Ownership Well Status Depth Capacity Platform Year Built Reconstr. Cost	Ownership Products Processing Units Capacity Facilities Storage - Crude - Products - Waste Shipping Pollutant Electricity Year Built Reconstr. Cost	Ownership UnderGround AboveGround Vicinity Refinery Substances Facilities Capacity Turnover Year Built Blending Reconstr. Cost	Pipe Lines - Type - Size - Material - Capacity - Year built - Reconstr. Cost Oil Cargo Vessel - Material - Capacity - Value Ship-Ship Transfer Tanker Truck Rail Tanker	Ownership Products Processing Units Capacity Facilities Waste Liquefaction Shipping Electricity Value Year Built Reconstr. Cost	Pipe Lines - Type - Size - Material Capacity Year built Cargo Ships Capacity Vessel Cost Ship-Ship Tanker-Truck Rail Tanker Retail-Cylinders Reconstr. Cost Rebuild- Timeframe	Ownership Storage Tank Cylinders Storage Facilities - Reliquefaction - Blending Capacity Fuel Turnover Year Built Reconstr. Cost

# Exposure Information Elements

ENERGY INFRASTRUCTURE .....				
Service Stations	Electricity Generation	Electricity Transmission	Electricity Towers/Poles	Electricity Substations
Ownership Site Category Tank Material Year Built Pumps Facilities Store Capital Fuel Turnover Reconstr. Cost	Ownership Type Storage Material Conveyors Boilers Generators Transformers Cooling Towers Chimneys Water Supply Switch Yard Facilities Capacity Year Built Reconstr. Cost	Ownership Lines Type Insulation Circuit Breakers Voltage Capacity Year Built Reconstr. Cost	Ownership Year Built Foundation Topography Height (Peak) Height (Cage) Height (Body) Width Circuits Conductors Types Design Materials Dead-end Reconstr. Cost	Ownership Type Usage Design Height Equipment Capacity Year Built Reconstr. Cost

# Exposure Information Elements

COMMUNICATION INFRASTRUCTURE						
Telephone Exchanges	Telephone Networks	Towers	Submarine Cables	Broadcasting	Satellite Earth Stations	Postal/Courier
Ownership Area of coverage Capacity - Frequency - Switches - Internet - # of lines Year Built Equipment Rebuilding- Timeframe Reconstr. Cost	Ownership Telephone line Switch nodes Materials (Coper/Fibre) Year Built Rebuilding Timeframe Reconstr. Cost	Ownership Tower Foundation Site Topography Tower Purpose Height of Tower Tower Design Tower Materials Year Built Rebuilding Timeframe Reconstr. Cost	Ownership Cable Network Cable Landing Station Frequency/ Bandwidth Cable Type Cable Capacity Offshore Destination Year Built Rebuilding Timeframe Reconstr. Cost	Ownership Broadcasting Type Purpose Site Name TV Station Radio station Studio Facilities Coverage Area Frequency Equipment Cable Networks Value Rebuilding Timeframe Reconstr. Cost	Ownership Type of Antenna # of Antennas Size of Antenna Capacity Equipment Construction Year Built Rebuilding Timeframe Reconstr. Cost	Ownership Mail Sorting Centres Delivery Vehicles

# Exposure Information Elements

URBAN WATER INFRASTRUCTURE				WASTE MANAGEMENT	HAZARDOUS SUBSTANCES	MAJOR INDUSTRIES
Potable Water Catchment	Potable Water Treatment	Waste Water Treatment	Water Transmission Networks			
Catchment Area Dams - Foundation - Length - Type - Spillway type - Material - Year Built - Reconstr. Cost - Height Gr. Water Well Criticality Equipment Pumping Storage Capacity Tanks/ Reservoirs	Ownership Storage Tank - Size - Foundation - Construction - Year Built/Upgrade Equipment: - Clarification - Filtration - Disinfection -Desalination -SCADA -Repair Timeframe Reconstr. Cost	Ownership Storage Tank Aeration Tank Sludge Tank Methane Gas- Chamber Equipment - Machinery - Disposal - Energy - Odor - Disinfection - Bio-chemical - Filtration Repair Timeframe Reconstr. Cost	Ownership Reticulation- Area Reticulation- Type Pumping- Stations Pipes Network Pipes Size Pipes Diameter Pipes Material Filtering Connectors Year Built Year Upgraded Repair Timeframe Reconstr. Cost	Collection Centres Transfer Stations Collection Trucks Incineration Plants Recycling Plants Landfills Waste type Energy Recovery Facility Reconstr. Cost	Facility usage List of substances Physical characters Chem. Characters Airborne thresholds Pictogram Hazard code Hazard Character Toxicity Severity Symptoms Key suggestions	Ownership Industry name Industry Structure Industry Usage Total Floor Area # of Buildings List of Facilities Year Built Building Materials Equipment Storage Warehouse Working Hours WasteManagement Liability Issues Critical Equipment Production Capacity Reconstr. Cost

# Exposure Information Elements

PRIMARY INDUSTRIES							
Agri. Crops	Agri. Horticulture	Agri. Dairy	Agri. Animal	Fisheries Wild	Fisheries Aquaculture	Forestry	Mining
Farm Size Crop Type Crop Calendar Crop Value Farm house Equipment Storage Size Processing Plant	Farm Size Plantation Type # of Plants Age of Plants Yield Pattern Equipment Storage Size Processing Plant Farm Value	Farm Size Animals Type # of Animals Age Mix of Animals Dominant Breed Sub-dominant Breed Equipment Ancillary Buildings Products Farm Value	Farm Size Animals Type Farming Type # of Animals Age Mix of Animals Dom. Breed Sub-dom. Breed Equipment Ancillary Buildings Products Farm Value	Fishing Zones Fishing Restrictions Endangered Species Port Location Trawlers Nets Total Capacity Storage Capacity Processing Plants	Farm Size Fish Type Fishing Stock Products Pattern Equipment Processing plants Ancillary Buildings Farm Value	Ownership Forest Area Status Structure Dm.Species Sub-dm. Species Products -Hard wood -Soft wood -VeneerLogs -Pulp Logs -Oils	Ownership Mining Area Operating Status Operating Type - Surface - Underground Commodities Equipment Production- Capacity Value

# Exposure Information Elements

POPULATION						
Remoteness Status	Demographic Composition	Socio-Economic Status	Population Health	Ambient Population	Risk Response	Social Capital
	Age profile Density Gender Migration Indigenous Ethnic Household	Household Income Household Dwelling Tenure Status Insurance Status	Physical health status Mental health status Disability status	Spatio-Temporal - Weekdays - Weekends Tourism Event Specific	Transport Access	Tenancy

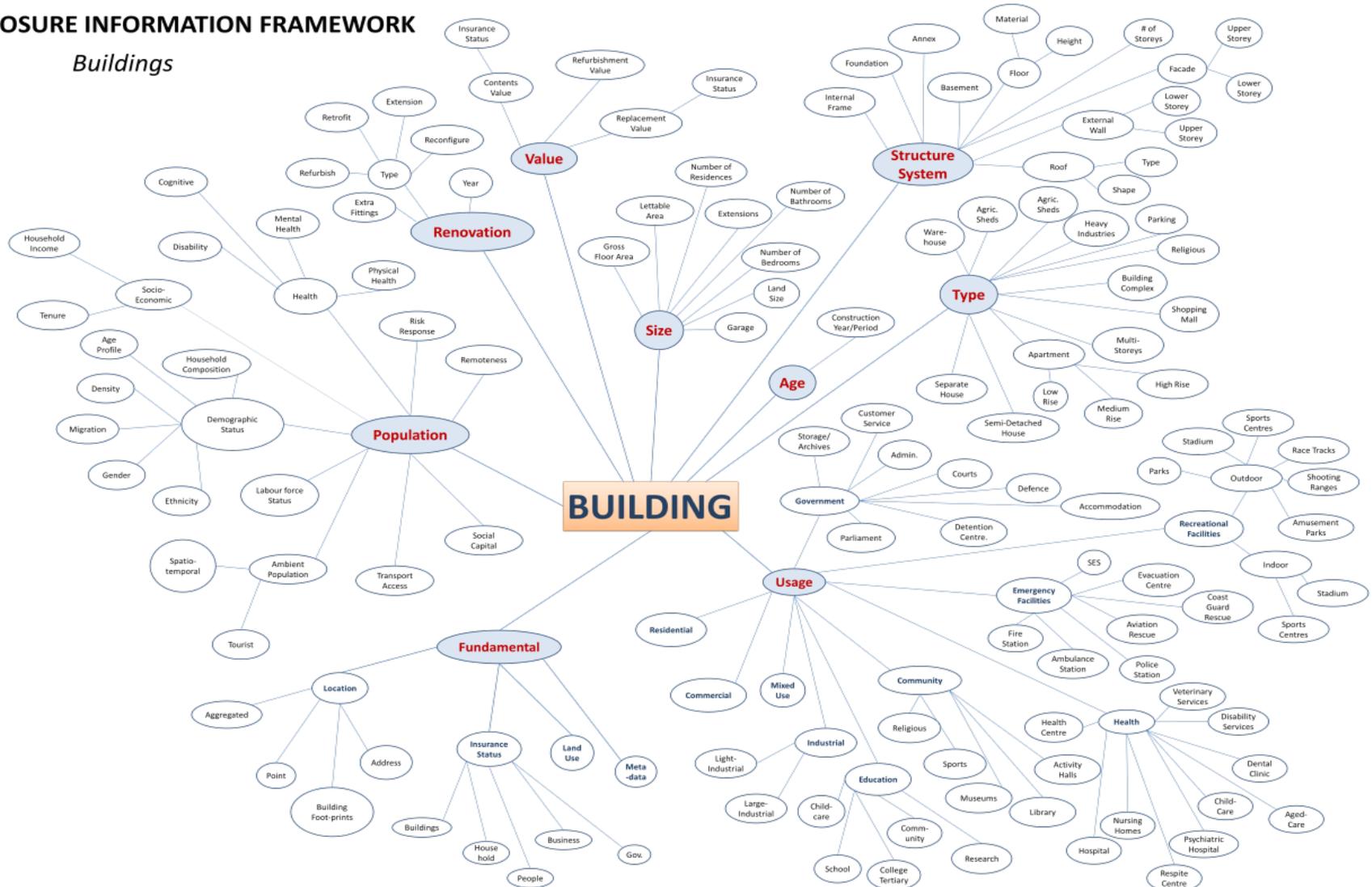
# Exposure Information Elements

BUSINESS/ECONOMIC						
Business Type	Business Structure	Space Usage	Business Operations	Number of Employees	Business Size	Macro Economic
ANZSIC - Division - Subdivision - Group - Class	Sole Trader Household Partnership Trust Corporate Government Non-Profit	Corp. Office Operational - Retail ..... - Wholesale - Manufacturing - Workshop - Storage - Education - Parking - Construction - .....	Cash Flow Cash Reserves Revenue Liabilities Age Track Record Operation. Hours Insurance Status Multi Sectors Multi Locations	Full Time Part Time Casual Permanent Non-Perm. Contractors Consultants Tenure	Employees - Sole Trader - Small - Medium - Large Turnover - Small - Medium - Large Assets - Fixed - Capital - Multi National	Labour Supply & Demand  Input-Output Analysis  CGE Analysis  .....

# BUILDINGS EXPOSURE INFORMATION MIND MAPS

## EXPOSURE INFORMATION FRAMEWORK

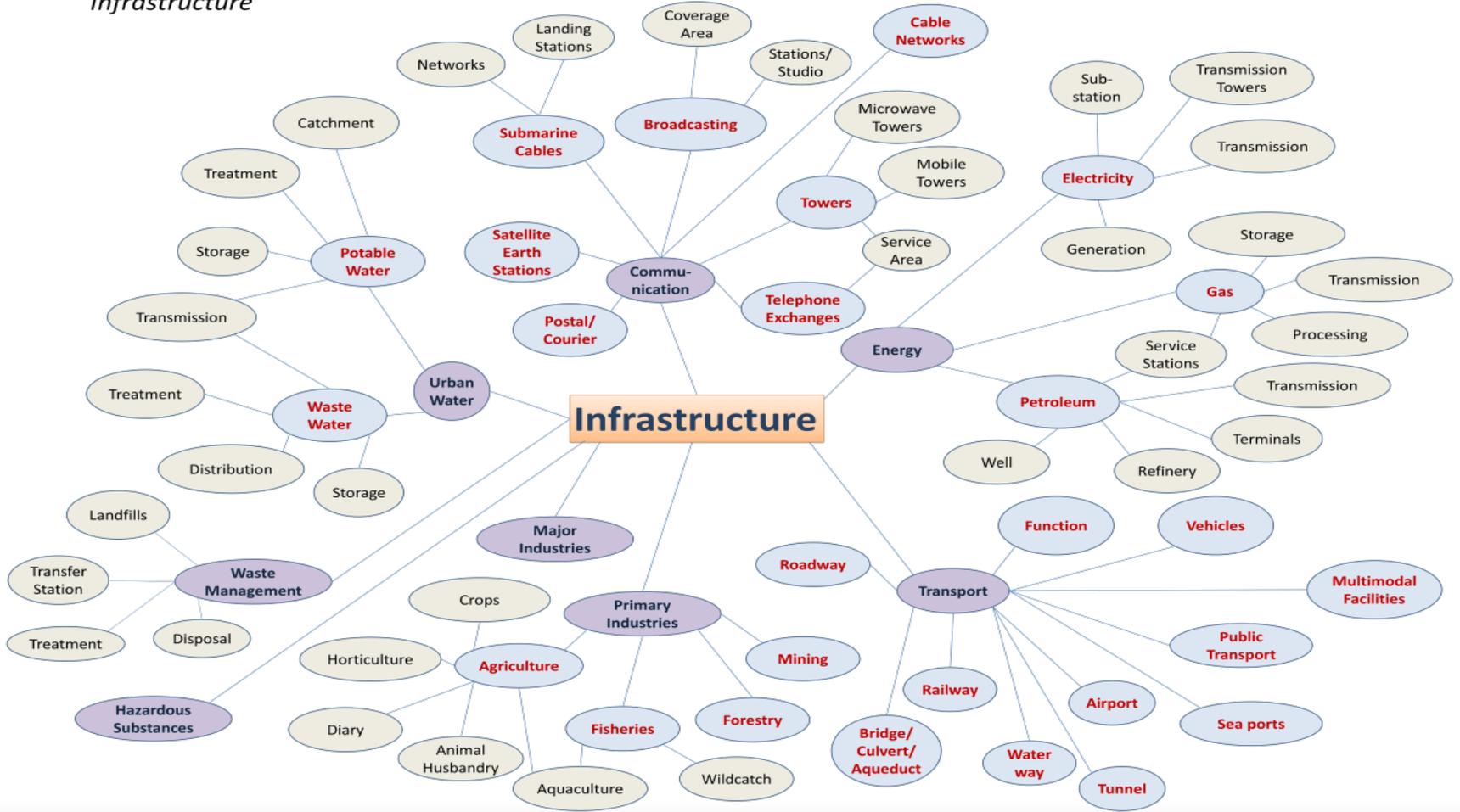
### Buildings



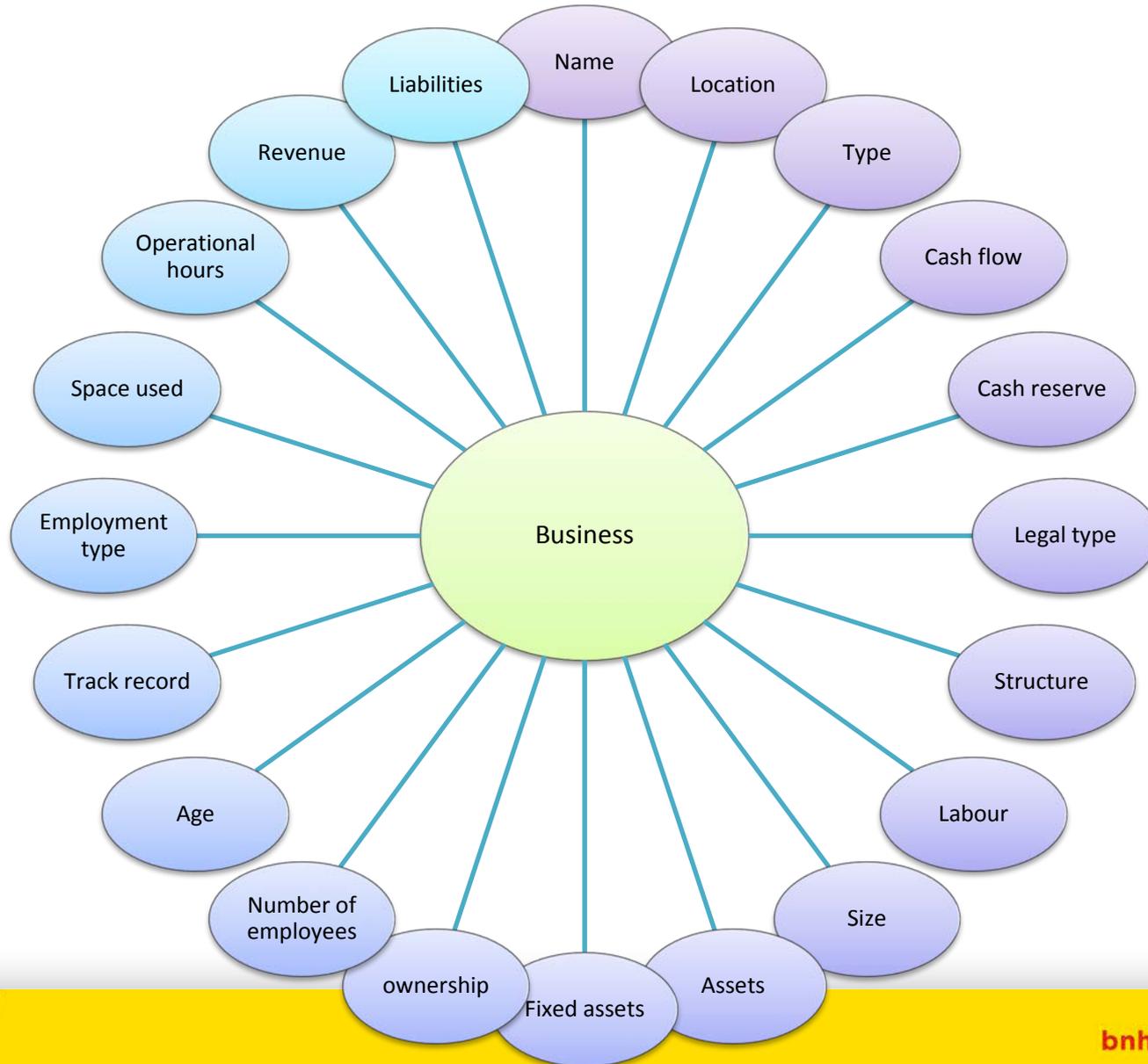
# INFRASTRUCTURE EXPOSURE INFORMATION MIND MAPS

## EXPOSURE INFORMATION FRAMEWORK

### Infrastructure



# BUSINESS EXPOSURE INFORMATION MIND MAPS



# ANHEF – AVAILABLE DATA SOURCES

## Highlights

- No agency is managing the exposure data for national coverage with consistency
- ABS – Aggregated info. of Population Census, Input-Output Analysis, National Accounts, Economic Activity, Agric. Census etc.
- GA – NEXIS has a statistical version on buildings and population, location information for some infrastructure data available
- ABR,ATO, BITRE, NIEIR, Universities etc. have relevant information
- NSW EICU – Comprehensive for Sydney and location information of infrastructure for other areas in NSW.
- State Spatial organisations have location information for infrastructure
- Tasmania, SA & WA have buildings details.
- State Emergency Organisations has some level of information
- City Councils,
- Company 360, ASX, ASIC, Insurance Sector, Company Reports, Utility Companies
- Researchers has no fundamental information to provide for disaster management

## Gaps

- No agency is managing comprehensive exposure data for the national coverage consistently

# ANHEF – FUTURE ACTIVITIES

## Consult for Expert Knowledge

- 1) Structural Engineering
- 2) Infrastructure Engineering
- 3) Social Sciences
- 4) Economics

## Exposure Information

- 1) Exposure Information Attributes
- 2) Standards of Attributes
- 3) Data Definitions of Attributes
- 4) Workshop for Endorsement

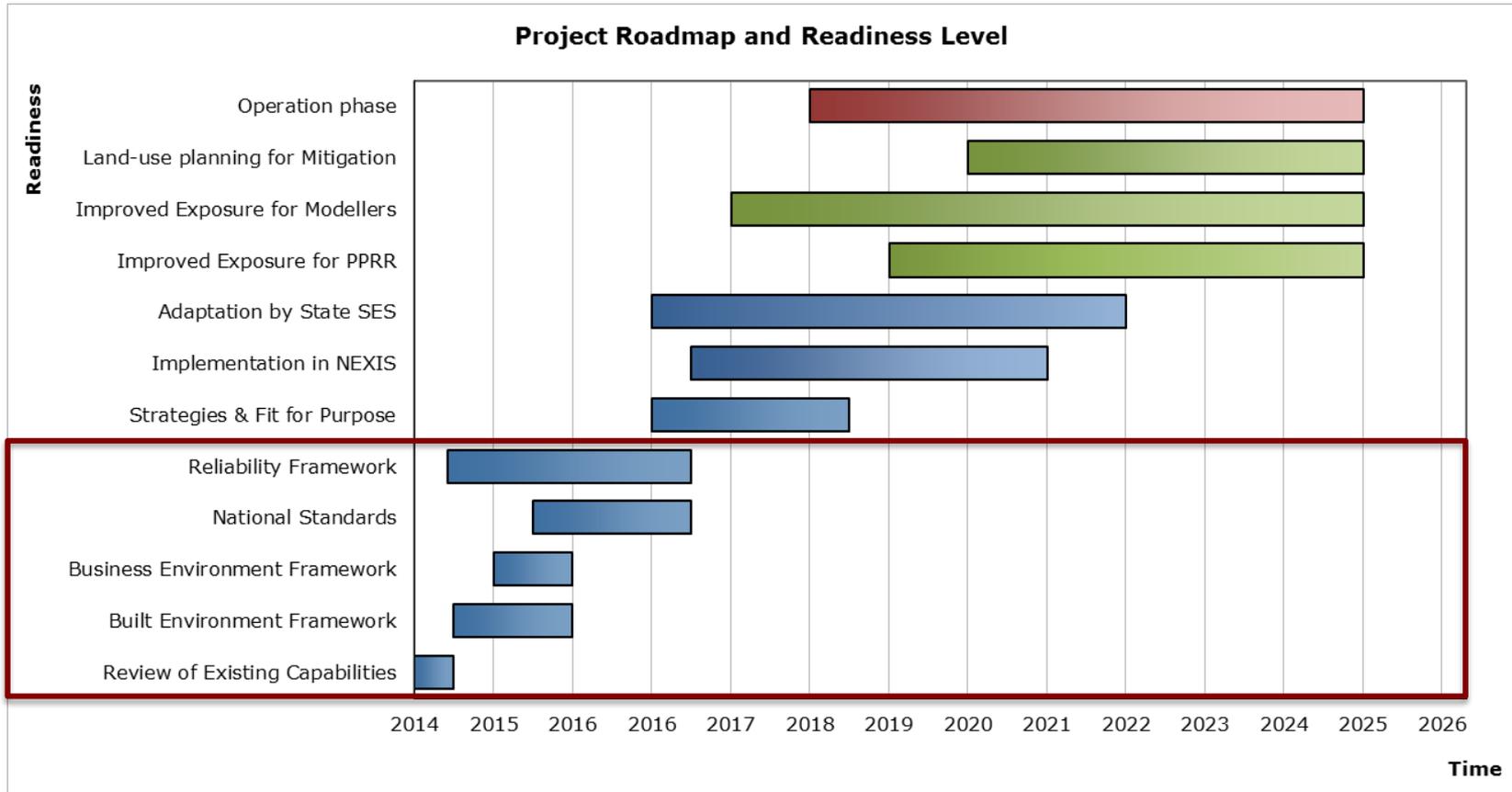
## Reliability Framework

- 1) User Perspective
- 2) Database Design
- 3) Reliability Model



# PROJECT UTILISATION PLAN

With Matt Hayne



# THANKYOU

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