



Curriculum

"RISK MODELER OF THE YEAR 2019"

*Business intelligence for the global insurance market



Who we are:

ERN was founded in Mexico City in 1996 as a company specialized in seismic engineering and evolved to the valuation of natural and anthropogenic phenomena that affect people, constructions and infrastructures. Since then we have striven to make our customers achieve their goals by realizing studies and projects in all the Mexican Republic and several countries in Latin America.

We have assembled a strong and experienced team, creating bonds with the Institute of Engineering of the UNAM, other universities and academics around the world, allowing us to capitalize the growth of scientific and technological development, translating them into products and cutting-edge services world class.

Our founders:

- Dr. Mario Ordaz Schroeder President, Partner
- Dr. Eduardo Reinoso Angulo CEO, Partner
- Dr. Eduardo Miranda Mijares Stanford, Professor

Mission:

¿For what purpose are we here?

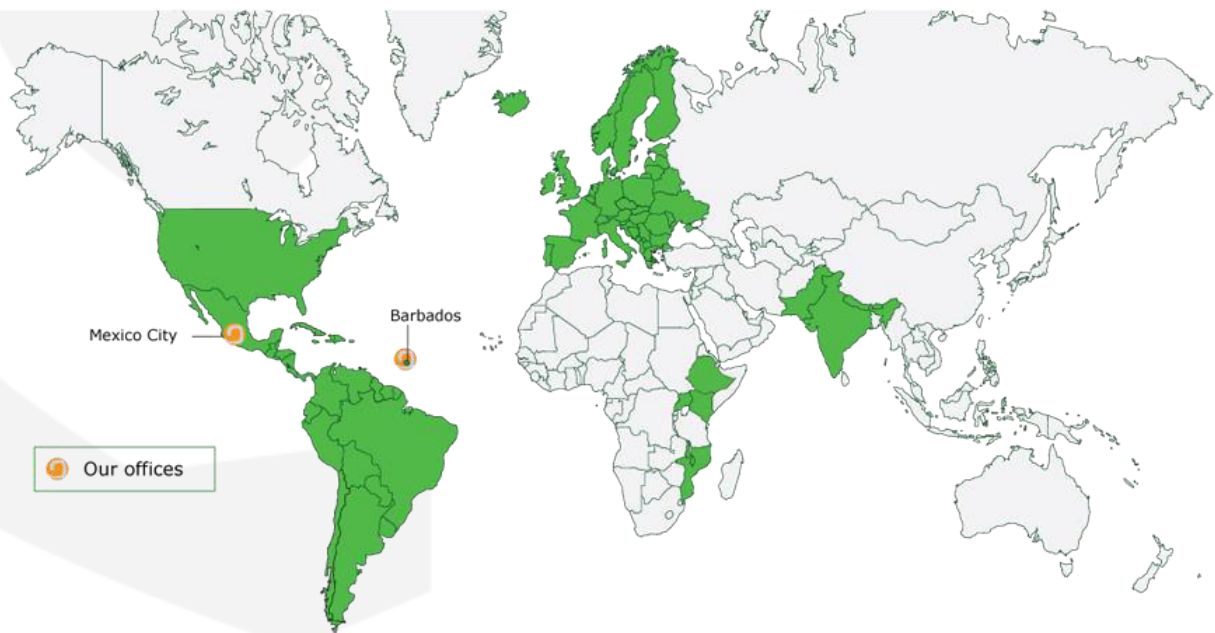
Provide our customers the most advanced knowledge and technology for better understanding and evaluation of natural risks, and propose measures to reduce possible human and material losses.

Vision:

¿What do we want to become?

Be the leader company in the evaluation of natural risks in the world, converting our products and services in a culture of safety, prevention and mitigation, developing our selves ethically and committed to preserve and improve the environment.

Worldwide presence



Certifications:

We are a Registered Trademark ®

We have the **-RENIECYT-** Certification (National Registry of Scientific and Technological Institutions and Enterprises) gave by the **CONACYT**.



Insurance Industry

curriculum

Insurance Industry

Construction Industry

Government

RISK MODELS

ERN provides the insurance sector with studies and tools for risk calculation, which help ensure that both the technical amount of the premiums as well as the amount of financial reserves to confront possible catastrophes are accurate. The use of our tools contributes to guarantee that insurance companies will be able to respond financially should a great earthquake occur. This system has been implemented in various Latin American countries, using ERN models.

In 2006, we finished the first system in the world capable of evaluating all simultaneous threats associated with hurricanes.

Expert systems

Software for the financial risk evaluation of buildings and infrastructure



R-PLUS

ERN's software for financial risk assessment



R-REGULATOR

Official software for the computation of catastrophic reserves of insurance companies



R-TARIFF

Computes the premium for suscription purposes



ERN software adapted to the following platforms
RMS (one)[®], AIR[®] Touchstone[®], OASIS[®]



We adapt our software to any specific requirement of our clients

Others:



R-AUTO

Computes the natural risk for cars



R-MONITORING

Computes in real time the risk of a portfolio due to hurricanes and earthquakes



R-GeoLOC

Computes the lat-long coordinates from an address database



R-HAZARD

Shows the hazard in a simplified way to any given location

Our research and developments have ended in risk assessment software that include the following threats:

Threats included:



Products and Services:

- ▶ Expert systems to estimate losses due to any threat
- ▶ Telephone and online information and assistance
- ▶ Integral training programmes
- ▶ Support tools such as help and tutorials
- ▶ Workshops, seminars and conferences
- ▶ Informative bulletins on natural events and their impact
- ▶ Evaluation of portfolios, and structures and special installations
- ▶ In situ inspection and determination of structural risk

Some of our main clients are:

- ▶ Insurance sector: insurance and reinsurance companies,
- ▶ Brokers
- ▶ Supervising and holding institutions
- ▶ Risk management companies.

SPECIAL PROJECTS

The objective of these studies is to estimate the seismic risk and the risk by hurricane for structures or portfolio of buildings. Risk premiums and the expected losses for a given event are estimated; in the case of seismic risk, the curves of the probable maximum loss (PML) for different periods of return are also computed.

These are some of the most important projects we have done.

INFRASTRUCTURE LOSS ESTIMATION OF NUEVO LEON STATE

Location: Monterrey, Nuevo León

Client: SARC, CONSULTORIA EN ANALISIS DE RIESGO, S.C.

Date: March 2018

R-PLUS® SOFTWARE CERTIFIED BY COLOMBIA FOR REGULATORY PURPOSES

Location: Colombia

Client: SUPERINTENDENCIA FINANCIERA DE COLOMBIA (SFC)

Date: 2017

STUDY OF SEISMIC AND HYDROMETEOROLOGICAL RISKS FOR THE PORTFOLIOS OF VITRO

Location: México City

Client: INTERPROTECCIÓN AGENTE DE SEGUROS Y DE FIANZAS

Date: Sep 2016

CONSULTING SERVICES IN NATURAL HAZARDS AND SYSTEM R-PERSON

Location: Mexico City

Client: CHUBB

Date: 2015 - 2016

STUDY OF SEISMIC RISKS FOR THE PORTFOLIOS OF INSURANCE AND ANALYSIS SPECIAL STRUCTURES

Location: Lima Perú

Client: RIMAC, SEGUROS Y REASEGUROS

Date: 2013 to date

STUDY OF SEISMIC RISKS FOR THE PORTFOLIOS OF PACIFICO SEGUROS AND ANALYSIS SPECIAL STRUCTURES

Location: Lima, Perú

Client: EL PACÍFICO PERUANO SUIZA COMPAÑÍA DE SEGUROS Y REASEGURO

Date: 2013 to date

STUDY OF SEISMIC RISKS FOR THE PORTFOLIOS OF LA POSITIVA INSURANCE AND REINSURANCE

Location: Lima, Perú

Client: LA POSITIVA SEGUROS Y REASEGUROS

Date: 2013 to date

STUDY OF SEISMIC AND HYDROMETEOROLOGICAL RISKS FOR COMPLEJO INDUSTRIAL "ETILENO XXI"

Location: Xalapa, Veracruz

Client: BRASKEM IDESA

Date: December 2015

INSTITUTIONAL MAPPING IN THE FIELD OF INSURANCE (EARTHQUAKE AND HURRICANE IN CIVIL INFRASTRUCTURE OF CFE)

Location: In several states within the Mexican Republic
Client: COMISION FEDERAL DE ELECTRICIDAD
Date: November 2015

STUDY OF SEISMIC AND HYDROMETEOROLOGICAL RISKS – EGIR

Location: Colima e Hidalgo
Client: SARC
Date: August 2015

STUDY OF SEISMIC AND HYDROMETEOROLOGICAL RISKS FOR INTERNATIONAL AIRPORT CITY MEXICO

Location: Mexico City
Client: AON RISK.
Date: August 2015

STUDY OF SEISMIC AND HYDROMETEOROLOGICAL RISKS FOR THE PORTFOLIOS OF VITRO, BIMBO AND BACHOCO

Location: Mexico City
Client: INTERPROTECCION, AGENTE DE SEGUROS Y DE FIANZAS, SA DE CV.
Date: June 2015

LICENSE FOR THE ERN-RISK EVALUATION SYSTEMS

Location: New York, USA
Client: GUY CARPENTER & COMPANY, LLC.
Date: February 2013 to date

INSURANCE RATE WEB SYSTEM FOR EARTHQUAKE AND HYDROMETEOROLOGICAL PHENOMENA

RISK MONITORING WEB SYSTEM FOR EARTHQUAKE AND HURRICANE ANNUAL LICENSE OF SYSTEM R (HYDROMETEOROLOGICAL PHENOMENA AND EARTHQUAKE)

Location: Mexico City
Client: AXA SEGUROS, SA DE CV.
Date: March 2014 to date

LICENSE OF NATURAL RISK SYSTEMS AND SERVICES, CONSULTING

Location: Chicago, USA
Client: AON BENFIELD INC
Date: March 2013 to date

ANNUAL LICENSE OF ERN'S EXPERT SYSTEMS

Location: Londres, Inglaterra
Client: WILLIS LTD
Date: April 2013 to date

MAP OF RISKS IN MONTE NACIONAL DE PIEDAD'S BRANCHES FOR THE INSTITUTIONAL BUSINESS CONTINUITY PLAN

Location: Mexico City
Client: NACIONAL MONTE DE PIEDAD
Date: October 2013 - January 2014

FULL CONSULTING SERVICES (INCLUDING SYSTEMS RS-MEX AND RH-MEX)

Location: Mexico City
Client: INFONAVIT
Date: March 2012 – February 2013

STUDY OF SEISMIC AND HYDROMETEOROLOGICAL RISKS FOR NACIONAL MONTE DE PIEDAD'S BUILDINGS

Location: Mexico City
Client: NACIONAL MONTE DE PIEDAD I.A.P.
Date: January 2013

TUNING SYSTEM RH-MEX (Version 2010)

Location: Mexico City
Client: ASOCIACIÓN MEXICANA DE INSTITUCIONES DE SEGUROS
Date: January 2013

ANUAL LICENSE OF ERN EXPERT SYSTEMS

Location: United Kingdom
Client: JLT REINSURANCE BROKERS LIMITED
Date: June 2012 to Date

UPDATE OF THE PML AND PURE PREMIUM MODEL FOR EARTHQUAKE

Location: Mexico City
Client: ASOCIACIÓN MEXICANA DE INSTITUCIONES DE SEGURO
Date: October 2012

Some of the most important projects in previous years.

EXPERT SYSTEM FOR EVALUATING HYDROMETEOROLOGICAL RISKS IN ASSETS LOCATED THROUGHOUT MEXICO - V2009

Location: Republic Mexican
Client: ASOCIACIÓN MEXICANA DE INSTITUCIONES DE SEGURO
Date: December 2008

STUDY OF LOSS ESTIMATION IN CONTENTS FOR INSURED ASSETS IN MEXICO

Location: Republic Mexican
Client: ASOCIACIÓN MEXICANA DE INSTITUCIONES DE SEGURO
Date: December 2008

INTEGRATION, ANALYSIS AND RISK MEASUREMENT TO ESTABLISH THE FINANCIAL MECHANISMS FOR ERN'S SYSTEM "FONDEN"

Location: Republic Mexican
Client: INSTITUTO DE INGENIERÍA UNAM
Date: December 2008

EXPERT SYSTEM FOR EVALUATING HYDROMETEOROLOGICAL RISK FOR REINSURED ASSETS IN MEXICO - VBETA

Location: Republic Mexican
Client: GEN RE
Date: February - May 2008

EXPERT SYSTEM FOR EVALUATING HYDROMETEOROLOGICAL RISK FOR ASSETS IN MEXICO - V1.0

Location: Republic Mexican
Client: ASOCIACIÓN MEXICANA DE INSTITUCIONES DE SEGUROS
Date: January 2006 - Nov 2007

STUDY OF SEISMIC VULNERABILITY IN MANAGUA (NICARAGUA)

Location: Nicaragua
Client: DRM-SINAPRED
Date: December 2004

EXPERT SYSTEM FOR EVALUATING SEISMIC RISK FOR ASSETS IN MEXICO V2.0

Location: Mexico City
Client: COMISIÓN NACIONAL DE SEGUROS Y FIANZAS
Date: June 2001

EXPERT SYSTEM FOR EVALUATING SEISMIC RISK IN THE REPUBLIC OF COLOMBIA

Location: Bogota, Colombia

Client: FASECOLDA

Date: August 2000

EXPERT SYSTEM OF COMPUTATION FOR DEFINING THE TECHNICAL RESERVES

Location: Republic Mexican

Client: COMISIÓN NACIONAL DE SEGUROS Y FIANZAS

Date: January 1999

EXPERT SYSTEM FOR SEISMIC RISK ASSESSMENT

Location: Mexico City

Client: ASOCIACIÓN MEXICANA DE INSTITUCIONES DE SEGUROS

Date: June 1996



Construction Industry

ENGINEERING PROJYECTS

At **ERN** we work hand in hand with the construction industry through the evaluation of the different hazards and risks affecting construction projects across Mexico and Latin America, thus contributing to safer, more functional, economic and sustainable developments.

Products and Services:

Seismic hazard studies

- ▶ Site response spectra
- ▶ Site accelerograms
- ▶ Seismic monitoring
- ▶ Seismic instrumentation

Hydro-meteorological hazards studies

- ▶ Wind speed
- ▶ Storm surge
- ▶ Flood
- ▶ Hail

Structural Engineering

- ▶ Vibrations
- ▶ Structure dynamical properties
- ▶ Structural inspection

Geophysical studies

- ▶ Seismic refraction
- ▶ Vertical electrical sounding
- ▶ Geohydrology
- ▶ Down-Hole and Cross-Hole
- ▶ Geo-electric (TEM-type for cavity detection)
- ▶ Geo-radar

Risk reduction consultancy

- ▶ Identification of natural hazards and vulnerability in engineering works
- ▶ Assistance in decision making and risk estimation for specific projects
- ▶ General assistance on natural risk

Some of our main clients are:

- ▶ Construction companies and real estate agencies
- ▶ Civil engineering design firms



SPECIAL PROJECTS

More than 500 projects throughout Mexico so far. The earthquake hazards assessment for the Terminal 2 of the International Airport of Mexico City and for the Reforma Tower are worthy of note.

These are some of the most important projects we have done.

SANTA ROSA

Location: Veracruz, Veracruz
Client: KALUZ
Date: April 2020

COPPEL TLAQUEPAQUE

Location: Guadalajara, Jalisco
Client: COPPEL
Date: April 2020

HOTEL SOLAZ

Location: Los Cabos, Baja California
Client: HOTEL SOLAZ
Date: March 2020

MC CORMICK

Location: Mexico City
Client: ISE INGENIERIA Y SOLUCIONES ESTRUCTURALES
Date: February 2020

AEROPUERTO INTERNACIONAL SANTA LUCIA

Location: Mexico City
Client: ROGELIO LÓPEZ VÁZQUEZ
Date: January 2020

GAMESA CELAYA

Location: Mexico City
Client: THE HASKEL
Date: January 2020

HORNO VERTICAL AGUA PRIETA SONORA

Location: Sonora
Client: THYSSENKRUPP INDUSTRIAL SOLUTIONS
Date: January 2020

ITESM

Location: Mexico City
Client: BECK GROUP
Date: December 2019

STAR MÉDICA ANGELÓPOLIS

Location: Mexico City
Client: GARCÍA JARQUE INGENIEROS
Date: December 2019

BAMBU BUILDING

Location: El Salvador, San Salvador
Client: BOROSCHEK
Date: December 2019

FENIX GAMESA

Location: Obregón City, Sinaloa
Client: HASKELL
Date: November 2019

TECHNOLOGY PARK AND SERVICES

Location: Mexico City
Client: HD DESARROLLOS Y ASOCIADOS
Date: October 2019

ATRIUM METEPEC

Location: Mexico City
Client: IMPULSORA DE DESARROLLO INTEGRAL
Date: October 2019

PUNTA MITA

Location: Mexico City
Client: ONE DEVELOPMENT GROUP
Date: September 2019

CANAL NACIONAL VEHICULAR BRIDGE

Location: Mexico City
Client: NABIJA KARAM HADAD
Date: September 2019

VIADUCTO KM 117-174

Location: Mexico City
Client: MEXPRESA
Date: March 2019

INSURGENTES NTE NO. 59

Location: Mexico City
Client: INTERIOR UNO
Date: March 2019

AMOCA - CAMPECHE BAY

Location: Mexico City
Client: SOIL SRL
Date: February 2019

ONE & ONLY LA MANDARINA

Location: Tepic, Nayarit
Client: RLH PROPERTIES
Date: January 2019

HOSPITALES ABC

Location: Mexico City
Client: SACMAG
Date: December 2018

CUATRO RIOS

Location: Culiacán, Sinaloa
Client: GCT GRUPO CONSTRUCTOR TRANSPORTIEREN
Date: December 2018

IVC PLANTA VIDRIERA, COAHUILA

Location: Mexico City
Client: SACMAG
Date: November 2018

ZONA PATRIMONIAL XOCHIMILCO

Location: Mexico City
Client: DELTARES
Date: November 2018

COSTCO WHOLESALE SANTA FE – LA MEXIACANA

Location: Mexico City
Client: CUEVAS
Date: November 2018

OCEANIA SHOPPING CENTER

Location: Mexico City
Client: PULSO INMOBILIARIO
Date: October 2018

UNIVERSITY TOWER

Location: Mexico City
Client: MTK DEVELOPERS
Date: September 2018

VIALIDAD RIO DE LOS REMEDIOS

Location: Mexico City
Client: OHL
Date: August 2018

LUMA

Location: Puerto Vallarta
Client: DESARROLLOS COMERCIALES Y HABITACIONALES VALLARTA
Date: August 2018

GIGANTE TACUBAYA

Location: Mexico City
Client: GIGANTE
Date: August 2018

"RUTA DE LA AMISTAD NO. 6666" BUILDING

Location: Mexico City
Client: MONTERREY INSTITUTE OF TECHNOLOGY
Date: August 2018

COPPEL VILLA DEL CARBON

Location: Mexico City
Client: COPPEL
Date: August 2018

LONDRES NO. 175

Location: Mexico City
Client: SURA
Date: June 2018

PODER LEGISLATIVO NO. 215

Location: Mexico City
Client: SURA
Date: June 2018

PUERTO ESCONDIDO AIRPORT

Location: Oaxaca, Oaxaca
Client: TAX ARQUITECTURA
Date: June 2018

PLAZA SCOTIABANK

Location: Mexico City
Client: SCOTIABANK
Date: June 2018

8.5 OBREGON

Location: Obregon City, Sonora
Client: BAJA INDUSTRIAL ENGINEERING AND CONSULTING
Date: June 2018

CRUZ AZUL LAGUNAS – OAXACA

Location: Oaxaca, Oaxaca
Client: THYSSENKRUPP MÉXICO
Date: May 2018

THE PARALLEL RESIDENCES

Location: Mexico City
Client: FINATERRA INNOVACIÓN INMOBILIARIA
Date: May 2018

ANAHUAC UNIVERSITY

Location: Mexico City
Client: UNIVERSIDAD ANÁHUAC
Date: May 2018

CETRAM IZTAPALAPA

Location: Mexico City
Client: CENTRO DE MOVILIDAD REHDOMA
Date: April 2018

MEDELLIN BUILDING NO. 202

Location: Mexico City
Client: GARCIA JARQUE
Date: April 2018

COGENERACIÓN TULA, HIDALGO

Location: Tula, Hidalgo
Client: IBERDROLA ENERGÍA ALTAMIRA DE SERVICIOS
Date: March 2018

TORRE PUNTO MAR

Location: Acapulco, Guerrero
Client: CORPORATIVO MARDAY
Date: February 2018

PUEBLA NO. 237 BUILDING

Location: Mexico City
Client: GARCIA JARQUE
Date: February 2018

GPR SANTA MARTHA ACATITLA

Location: Mexico City
Client: GAP METROPOLITANA
Date: February 2018

ALVARO OBREGÓN No. 286

Location: Mexico City
Client: INMOBILIARIA ALVARO OBREGON
Date: February 2018

SANTA MARIA LA RIBERA Y SAN RAFAEL

Location: Mexico City
Client: TRESALIA SANTA MARIA LA RIBERA
Date: December 2017

COPPEL STORES

Location: Oaxaca, Oaxaca
Client: COPPEL
Date: December 2017

BUILDINGS OF MONTERREY INSTITUTE OF TECHNOLOGY AND HIGHER EDUCATION

Location: Mexico City
Client: MONTERREY INSTITUTE OF TECHNOLOGY
Date: December 2017

PANAMERICAN UNIVERSITY

Location: Mexico City
Client: CENTROS CULTURALES DE MÉXICO
Date: December 2017

HENRY FORD

Location: Mexico City
Client: MARCA PROMOTORA HABITAT
Date: December 2017

INSURGENTES NO. 1731

Location: Mexico City
Client: PULSO INMOBILIARIO
Date: November 2017

THE TRANQUILA HOTEL

Location: Tepic Nayarit
Client: LA TRANQUILA RESORT AND SPA
Date: October 2017

PASEOS DE TAXQUEÑA

Location: Mexico City
Client: GARCIA JARQUE
Date: October 2017

SONORA 141

Location: Mexico City
Client: ALBERTO BUZALI COHEN
Date: September 2017

SENATE OF THE REPUBLIC

Location: Mexico City
Client: RUYDAEL VIVANCO DE GYVES
Date: July 2017

GLORIETA CIBELES

Location: Mexico City
Client: CORPORATIVO 001 VILLA MADRID
Date: April 2017

INSURGENTES 1346

Location: Mexico City
Client: QUINTA FACHADA
Date: February 2017

CAMPANARIO

Location: Querétaro, Querétaro
Client: CASAS SIGLO XXI
Date: February 2017

20 NOVEMBER HOSPITAL

Location: Mexico City
Client: GARCIA JARQUE INGENIEROS
Date: December 2016

GEOPHYSICAL STUDY OF ELECTRICAL TOMOGRAPHY

Location: Xalapa, Veracruz
Client: GEOTECNICA Y SUPERVISIÓN TÉCNICA S.A. DE C.V.
Date: December 2016

MITIKHA

Location: Mexico City
Client: MTK DEVELOPERS
Date: November 2016

PLAZA DE TOROS

Location: Morelia, Michoacán
Client: ESPECTACULOS TAURINOS DE MORELIA
Date: October 2016

PASEO COAPA

Location: Mexico City
Client: GICSA
Date: October 2016

POPOCATÉPETL

Location: Mexico City
Client: DESARROLLADORA JOLE
Date: August 2016

DETECTION OF AN UNDERGROUND INFRASTRUCTURE AT A DEPTH OF 10 METERS IN THE TRANSMISSION LINE SUBSTATION I ENTQ. S.E. II-S.E. III UNDERGROUND, 115 kv, 2c,

Location: Ciudad Madero, Tamaulipas
Client: GEOTEST
Date: July 2016

BUILDING ATLOCOMULCO – PALMITAS

Location: Mexico City
Client: EURO ESTUDIOS
Date: July 2016

BEACH HOTEL THE CID

Location: Cancún, Quintana Roo
Client: PROMOTORA Y DESARROLLADORA PULSO INMOBILIARIO S.C
Date: May 2016

SANATOR HOTEL

Location: Cancun Quintana Roo
Client: PROMOTORA Y DESARROLLADORA PULSO INMOBILIARIO S.C
Date: May 2016

BUILDINGS ATTORNEY GENERAL'S OFFICE (PGR)

Location: Mexico City
Client: ROGERIO EDGAR PACHECO CARMONA
Date: May 2016

BRIDGE PAPAGAYO

Location: Acapulco, Guerrero
Client: JORGE ARRIOLA Y ASOCIADOS
Date: May 2016

INFIERNILLO VIADUCT

Location: Acapulco, Guerrero
Client: JORGE ARRIOLA Y ASOCIADOS
Date: May 2016

LAKE ALBERTO

Location: Mexico City
Client: BE GRAND
Date: April 2016

REFORMA 336

Location: Mexico City
Client: MOISES FARCA
Date: December 2015

NEW MEXICO INTERNATIONAL AIRPORT

Location: Mexico City
Client: SACMAG – CONSORCIO TASANA
Date: November 2015

DUCTO PEMEX

Location: Mexico City
Client: MOTA-ENGIL
Date: October 2015

PLANTA CEMENTO

Location: Honduras, San Pedro Sula
Client: CENOSA - THYSSENKRUPP
Date: October 2015

PROJECT "PASEO XOCHIMILCO"

Location: Mexico City
Client: PARKS INGENIERÍA
Date: September 2015

CAMPOS ELISEOS 238

Location: Mexico City
Client: CAMPOS ELISEOS
Date: July 2015

NEW BUILDING OF THE US EMBASSY

Location: Mexico City
Client: LANGAN
Date: May 2015

CENTRAL A4T PEMEX

Location: Villa Hermosa, Tabasco
Client: GEOTEST
Date: April 2015

THE TECHNOLOGICAL MUSEUM (MUTEC)

Location: Mexico City
Client: ENRIQUE NORTEN
Date: March 2015

THREE BRIDGES THE MARQUESA VIADUCTO

Location: Mexico City
Client: GRUPO SEPSA
Date: November 2014

LINEA 4 MARTIN CARRERA

Location: Mexico City
Client: MEXTYPSA
Date: October 2014

EXPANSIÓN OF ACAPULCO AIRPORT

Location: Acapulco, Guerrero.
Client: ALBERTO KALACH
Date: October 2014

VIADUCTO PUEBLA

Location: Puebla, Puebla
Client: EURO ESTUDIOS
Date: June 2014

THE TAHUANDO BRIDGE

Location: Ibarra, Ecuador
Client: PANAVIAL
Date: December 2013

NEW BASEBALL STADIUM IN CULIACÁN

Location: Culiacan, Sinaloa
Client: VIBOSA
Date: October 2013

"LA UNIDAD" BRIDGE,

Location: Ciudad Del Carmen Campeche
Client: CONSULTORA CMING
Date: August 2013

EOLIAN PROJECT "INGENIO"

Location: Oaxaca, Oaxaca
Client: ACCIONA ENERGIA
Date: July 2012

INTEL DESING CENTER

Location: Zapopan Jalisco
Client: TURNER- MARNOS
Date: June 2012

"HUITES" BRIDGE

Location: Sonora
Client: JORGE ARRIOLA Y ASOCIADOS
Date: July 2011

TREATMENT PLANT ATOTONILCO

Location: Atotonilco, Hidalgo
Client: GRUPO CARSO
Date: March 2011

PUERTA DE HIERRO HOSPITAL

Location: Colima, Colima
Client: ARQ. HECTOR ORTIZ
Date: February 2010

MEXICO TRANSFER CENTER "METRO ROSARIO"

Location: Mexico City
Client: INPROS
Date: September 2009

BREWERY PLANT

Location: Chihuahua, Chihuahua
Client: FEMSA
Date: June 2008

TORRE REFORMA

Location: Mexico City
Client: LBR ARQUITECTOS
Date: December 2007

INTERNATIONAL AIRPORT OF LOS CABOS

Location: Cabo San Lucas, B.C.
Client: CH2M
Date: March 2007

INDUSTRIAL PARK "PAJARITOS"

Location: Coatzacoalcos Veracruz
Client: INNOPHOS
Date: July 2006

SUBURBAN TRAIN

Location: Mexico City
Client: GICSA
Date: June 2006

MARINA TERMINAL, TOPOLOBAMPO

Location: Topolobampo
Client: MEG CONSULTING LTD
Date: November 2005

REFINERY "GENERAL LAZARO CARDENAS DEL RIO"

Location: Minatitlan, Veracruz
Client: DRAGADOS INDUSTRIAL
Date: September 2005

TERMINAL 2 DEL AICM

Location: Mexico City
Client: AEROPUERTOS Y SERVICIOS AUXILIARES (ASA)
Date: February 2005

INTERCONTINENTAL AIRPORT TOWER OF QUERÉTARO

Location: Santiago de Querétaro
Client: TGC INGENIERÍA
Date: April 2004

CERVECERÍA OF COLIMA

Location: Colima, Colima
Client: GRUPO MODELO
Date: January 2004

DELTA PARK MALL

Location: Mexico City
Client: GRUPO DAHNOS
Date: February 2003

REGIONAL BUILDING BBVA BANCOMER

Location: Hermosillo, Sonora
Client: BBVA BANCOMER
Date: May 2002

BBVA BANCOMER CENTER

Location: Mexico City
Client: BBVA BANCOMER
Date: October 2001

"TEMPLO DE LA COMPAÑÍA"

Location: Puebla, Puebla
Client: GOBIERNO DEL ESTADO DE PUEBLA
Date: February 2000

SUPREME COURT OF JUSTICE BUILDING

Location: Mexico City
Client: SUPREMA CORTE DE JUSTICIA CD. DE MÉXICO
Date: May 1999

SPECIAL PROJECTS HYDROLOGICAL STUDY

These are some of the most important projects we have done:

GEO LA AURORA

Location: Tepic, Nayarit
Client: PROMOTORA TURÍSTICA PLAYA VELA SA DE CV
Date: February 2013

THREE LAKES, GUERRERO

Location: Acapulco, Guerrero
Client: GEO GUERRERO, SA DE CV.
Date: June 2012

EX HACIENDA, VALLEY OF LIGHT.

Location: Acapulco, Guerrero
Client: GEO GUERRERO, SA DE CV.
Date: February 2011

THREE WOODS

Location: Acapulco, Guerrero
Client: GEO GUERRERO, SA DE CV.
Date: November 2011

THE POBLADO LA MORA

Location: Tepic, Nayarit
Client: GEO GUERRERO, SA DE CV.
Date: November 2011

MORROCOY II

Location: Ixtapa, Guerrero
Client: GEO GUERRERO, SA DE CV.
Date: March 2011

BOMBEO FLAMINGOS

Location: Ixtapa, Guerrero
Client: GEO GUERRERO, SA DE CV.
Date: October 2010

STUDY OF WIND AND FLOODING SECRET OF THE SEA

Location: Boca del Rio, Veracruz
Client: PABELLÓN DE LA LOMA DESARROLLO, SA DE CV.
Date: September 2010

STUDY OF FLOOD PROTECTION AND RECOMMENDATIONS OF TULIPS VILLAS

Location: Acapulco, Guerrero
Client: GEO GUERRERO, SA DE CV.
Date: June 2009



curriculum

Insurance Industry

Construction Industry



Government

Government

RISK MANAGEMENT PROJECTS

The Risk Management department offers specialised services on natural and anthropogenic hazards and risks to both public and private sectors. These are designed to provide decision makers with the necessary information in the field of land use planning, urban development, disaster prevention, risk evaluation and civil protection.

Products and Services:

- ▶ Integral Risk Management strategy (EGIR)
- ▶ Atlas of natural and anthropogenic hazards and risks estimation of damage and expected losses in buildings and infrastructure
- ▶ Integral training programmes: workshops, seminars and conferences
- ▶ Land use planning
- ▶ Civil protection plans
- ▶ Urban and rural development strategies and urban planning
- ▶ Warning systems for different threats
- ▶ Formulation of prevention plans and emergency response programmes
- ▶ Mitigation Strategies

Computer Systems



R-CAPRA

Analysis and visualization of risks, hazards and exposure



R-ATLAS

GIS system for risk management, designed for the use of municipal, state and regional governments

Some of our main clients are:

- ▶ National, State and municipal governments.
- ▶ Multinational Institutions: The World Bank, the Inter-American Development Bank.

IMPORTANT RISK MANAGEMENT PROJECTS

These are some of the most important projects we have done:

INTEGRAL RISK MANAGEMENT STRATEGY (EGIR) FOR THE STATE OF GUANAJUATO

Client: THE STATE GOVERNMENT OF GUANAJUATO

Date: 2019 under development

Develop through a process of planning, organization and instrumentation, the appropriate scheme of risk management according to the conditions of vulnerability of the state infrastructure, including the design of the financial instruments for its transfer, having as purpose the forecast, reduction and prioritized control of the risk of disaster in society, fighting the structural causes of natural disasters, as well as strengthening the resilience capacities of society, and consequently reducing the financial impact of the Government of the State of Guanajuato in the attention of the damages caused by the natural disasters

INTEGRAL RISK MANAGEMENT STRATEGY (EGIR) FOR THE STATE OF CHIAPAS

Client: THE STATE GOVERNMENT OF CHIAPAS

Date: 2017 under development

Develop through a process of planning, organization and instrumentation, the appropriate scheme of risk management according to the conditions of vulnerability of the state infrastructure, including the design of the financial instruments for its transfer, having as purpose the forecast, reduction and prioritized control of the risk of disaster in society, fighting the structural causes of natural disasters, as well as strengthening the resilience capacities of society, and consequently reducing the financial impact of the Government of the State of Chiapas in the attention of the damages caused by the natural disasters

INTEGRAL RISK MANAGEMENT STRATEGY (EGIR) FOR THE STATE OF VERACRUZ

Location: Veracruz, Veracruz

Client: THE STATE GOVERNMENT OF VERACRUZ

Date: 2017 – 2018

Develop through a process of planning, organization and instrumentation, the appropriate scheme of risk management according to the conditions of vulnerability of the state infrastructure, including the design of the financial instruments for its transfer, having as purpose the forecast, reduction and prioritized control of the risk of disaster in society, fighting the structural causes of natural disasters, as well as strengthening the resilience capacities of society, and consequently reducing the financial impact of the Government of the State of Veracruz in the attention of the damages caused by the natural disasters.

CCRIF SPC RISK MANAGEMENT SPECIALIST

Location: Caribe and Centro America countries

Client: CARIBBEAN CATASTROPHE RISK INSURANCE FACILITY

Date: 2015-current

The consortium ERN/RED comprises many years of experience in the activities related to its new functions as Risk Manager Specialist for CCRIF SPC, including the development of risk models for the insurance industry in Latin America, the Caribbean and Europe, as well as previous participation in the design of conventional and non-conventional risk-transfer instruments

SPHERA MODEL DEVELOPMENT

Location: 2017-2019

Client: CCRIF-SPC

Date: 2017-2019

Cat risk model development (tropical cyclone and earthquake)

DISASTER RISK ASSESSMENT OF UTTARAKHAND, INDIA.

Location: Uttarakhand (India) and Mexico City.

Client: DHI & Project Implementation Unit TA & CBDRM & World Bank.

Date: 2016-current

This project estimated the threat and potential consequences of flooding, earthquakes, landslides, and industrial hazards in Uttarakhand. It comprised the development of a comprehensive inventory of data for hazards and assess the likelihood and consequence of these hazards in the future.

DEVELOPMENT OF NATIONAL DISASTER RISK PROFILES FOR SUB-SAHARAN AFRICA. EARTHQUAKE RISK MODELLING.

Location: Africa

Client: GFDRR - WORLD BANK

Date: July 2015 - March 2017

In this project ERN developed probabilistic national-level earthquake risk models for Ethiopia, Kenya, Uganda (april 2016) and Cape Verde, Malawi, Mozambique (march 2017). For the risk estimation a seismic hazard assessment was developed using information of historical earthquake catalogs, seismic source information and attenuation relationships. Vulnerability models for the asset typologies identified in the study area were proposed.

These risk profiles provide loss metrics related to the affected population, damage to physical assets and impact on GDP.

RISK ANALYSIS AND IDENTIFICATION OF POSSIBLE RISK REDUCTION MEASURES FOR SELECTED IIRSA INFRASTRUCTURE IN PERU AND CHILE

Location: Peru and Chile

Client: INTER-AMERICAN DEVELOPMENT BANK (IDB)

Date: September 2015 - under development

In this project ERN and RBA developed a probabilistic risk estimation for selected IIRSA infrastructure in Peru and Chile (ports and airports). As part of the risk analysis, probabilistic hazard estimation for earthquake and tsunami was developed. Vulnerability functions were verified by field survey of the structural system of the selected infrastructure. Mitigation reduction measures were proposed according to the results of the risk assessment.

DEVELOPMENT OF A METHODOLOGY AND SOFTWARE TOOL FOR THE ESTIMATION OF DISASTER RISK REDUCTION (DRR) STRATEGIES AT COUNTRY LEVEL

Location: All Latin America countries

Client: INTER-AMERICAN DEVELOPMENT BANK (IADB)

Date: March 2015 - under development

The purpose is to develop a methodology and software tool that would allow the prioritization of public investments in Disaster Risk Reduction (DRR) at national and sub-national level.

R SYSTEM

Location: All Latin America

Client: ERN DEVELOPMENT

Date: 2012 – 2015

The R system is a computational tool developed by ERN for the natural hazards assessment of buildings portfolios insured in Latin America. With this tool the Probable Maximum Loss (PML) and the Pure Risk Premium can be obtained.

STUDY OF NATURAL HAZARD IN DIVERSE INFRASTRUCTURE FOR THE STATE OF OAXACA

Location: Oaxaca, Oax.

Client: SARC, CONSULTORIA EN ANALISIS DE RIESGO

Date: October 2014

CLIMATE CHANGE AND URBAN DEVELOPMENT STUDIES FOR ASUNCION, PARAGUAY

Location: Asunción, Paraguay

Client: IDOM AND INTER-AMERICAN DEVELOPMENT BANK (IDB)

Date: October 2013 - May 2014

In this project, ERN was in charge to develop the "Consulting Engagement #2: Disaster risk and climate change vulnerability assessment". For Asuncion the priority natural hazards were: flood by overflow of the Paraguay River, flood by overflow of small rivers inside the city and flood by water accumulation in flat areas inside the city.

PHYSICAL ASSESSMENT OF VULNERABILITY TO EARTHQUAKE RISK IN THE CANTON OF SAN JOSE, COSTA RICA

Location: San Jose, Costa Rica

Client: PREVENTION OF RISKS AND EMERGENCY CARE (CNE)

Date: October 2013 - May 2014

This study focuses in downtown San José, Costa Rica. The assessed districts are Mata Redonda, Hospital, Cathedral, Merced and Carmen, where 4 types of structures have been evaluated; Hospitals, Dwellings, Schools and Government Offices.

UPDATE ATLAS OF NATURAL HAZARDS FOR THE DISTRICT OF CABO, BCS LA- 2013 - N28 – 803008998.

Location: Cabos, BCS

Client: MUNICIPALITY OF LOS CABOS, B.C.S

Date: October 2013 - April 2014

This project is about an update of previous Atlas of natural hazards for Los Cabos, BCS. It was analyzed several natural hazards (earthquake, tsunami, landslide, flooding, drought, tornado, winter storm, tropical storm, among others.) with specially attention in flooding and landslide which are the most representative natural events at Los Cabos, BCS.

As a result of this project, GIS maps for each hazard associated to different periods of return were obtained. This result will enable the Municipality of Los Cabos for implementing programs to prevent natural disasters or for emergency response and other urban development activities.

TECHNICAL ASSISTANCE PROJECT FOR BHUTAN

Location: Thimphu, Bhutan

Client: THE WORLD BANK

Date: March 2013 - August 2013

The World Bank hired ERN to give technical support to the Department of Disaster Management of the Royal Government of Bhutan on the seismic risk assessment for Thimphu Thromde. The idea is to develop a national risk assessment platform and to assess the earthquake risk in Thimphu Thromde (Bhutan Capital) which would contribute towards the development of a holistic strategy to create action plans oriented to reduce, prevent and mitigate physical and human damage if an earthquake occurs.

TECHNICAL ASSISTANCE PROJECT FOR PAKISTAN

Location: Islamabad, Pakistan

Client: THE WORLD BANK

Date: November 2012 – November 2013

The World Bank hired ERN to give technical support to the Government of Pakistan on the seismic risk assessment. The idea is to carry out a Technical Assistance Project (TAP) in Pakistan to support the National Working Group on risk assessments to develop estimations of PML and Risk Premium for all the country to contribute towards the development of a catastrophe risk financing strategy and subsequently risk transfer and sharing mechanisms, to address liquidity gaps and challenges in the immediate aftermath of a disaster.

CAPRA 2.0. PROBABILISTIC DISASTER RISK ASSESSMENT INITIATIVE

Location: El Salvador, Costa Rica, Peru, Chile, Colombia and Panama

Client: THE WORLD BANK

Date: October 2010 – December 2012

The main objectives of this project was the consolidation and support of the capacity building on probabilistic risk assessment using CAPRA software platform in Latin America and the Caribbean, and to strengthen this platform with adequate maintenance and software updating.

NATURAL RISK AND HAZARD ATLAS FOR THE ALVARO OBREGON MUNICIPALITY

Location: Mexico City.

Client: MUNICIPAL OFFICE FOR CIVIL PROTECTION, ÁLVARO OBREGÓN, MUNICIPALITY

Date: October 2010 - December 2010

The Alvaro Obregon municipality hired ERN to work on the creation of full GIS natural risk and hazard maps. The idea is to gather, compile and create all information necessary to address urban planning and mitigation for multiple hazards such as: floods, landslides, hail, snowfall, anthropogenic hazard, etc

NATURAL RISK AND HAZARD ATLAS FOR THE STATE OF OAXACA, MEXICO

Location: Oaxaca, Oaxaca

Client: STATAL INSTITUTE FOR CIVIL PROTECTION

Date: November 2009 – October 2010

The State of Oaxaca hired ERN to work on the creation of a GIS-based natural risk and hazard atlas for the earthquake, tsunami and surge phenomena. The idea is to gather, compile and create all information necessary to address urban planning and mitigation. As a result of this project, the R-Atlas Oaxaca module software was developed.

CENTRAL AMERICA PROBABILISTIC RISK ASSESMENT – CAPRA – PHASE II GUATEMALA, SALVADOR, BELIZE

Location: Guatemala, Salvador, Belize

Client: THE WORLD BANK, WB, INTERAMERICAN DEVELOPMENT BANK, IADB

Date: February 2009 – July 2010

The general objective of this program is the development of CAPRA as a techno-scientific methodology and information platform, integrated by tools for the assessment and communication of risk derived from natural hazards in the region at several territorial levels.

CENTRAL AMERICA PROBABILISTIC RISK ASSESMENT – CAPRA – PHASE II HONDURAS

Location: Honduras

Client: INTERAMERICAN DEVELOPMENT BANK, IADB

Date: February 2009 – July 2010

The general objective of this program is the development of CAPRA as a techno-scientific methodology and information platform, integrated by tools for the assessment and communication of risk derived from natural hazards in the region at several territorial levels.

NATURAL RISK AND HAZARD ATLAS FORT THE STATE OF NUEVO LEON, MEXICO

Location: State of Nuevo León

Client: NUEVO LEÓN URBAN DEVELOPMENT AGENCY

Date: November 2008 – November 2010

The State of Nuevo Leon hired ERN to work on the creation of full GIS natural risk and hazard maps. The idea is to gather, compile and create all information necessary to address urban planning and mitigation. Although the project is multihazard (floods, landslides, hail, snowfall, anthropogenic hazard, etc.), the main natural hazards in this northern part of the country are due to floods, particularly flash floods. Very sophisticated information was available for the flood and landslide computation, such as Lidar data, which makes the flood and landslide hazard computations more reliable.

APPLICATION AND UPDATING OF THE RISK AND RISK MANAGEMENT INDEX SYSTEM TO ARGENTINA, BARBADOS, BOLIVIA, CHILE, COLOMBIA, ECUADOR, JAMAICA, MEXICO, PANAMA, PERU, DOMINICAN REPUBLIC, TRINIDAD AND TOBAGO.

Location: Argentina, Barbados, Bolivia, Chile, Colombia, Ecuador, Jamaica, Mexico, Panama, Peru, Dominican Republic, Trinidad and Tobago.

Client: INTER AMERICAN DEVELOPMENT BANK (IADB)

Date: December 2008 - August 2009

The objective of the project corresponds to the Action Plan of the IADB for improving Disaster Risk Management (DRM) 2005-2008 (GN-2339-1) through the application and updating of the risk and risk management indicators system in the LAAC region. Risk and risk management indicators were calculated for Argentina, Barbados, Bolivia, Chile, Colombia, Ecuador, Jamaica, Mexico, Panama, Peru, Dominican Republic, Trinidad and Tobago which complement indicators calculated in other initiatives (CAPRA) for countries like Guatemala, Honduras, El Salvador, Nicaragua, Costa Rica and Belize.

FLOOD ASSESMENT AND CONTROL FOR TWO BASINS IN NUEVO LEON.

Location: State of Nuevo León

Client: NUEVO LEÓN URBAN DEVELOPMENT AGENCY

Date: November 2008 - August 2009

The State of Nuevo Leon hired ERN to fulfill standard hydrologic analysis of two basins where new and rapid urban developments are taken place. The idea was to present to the decision makers different possible solutions to control future flash floods in the area.

CENTRAL AMERICA PROBABILISTIC RISK ASSESMENT – CAPRA

Location: Nicaragua and Costa Rica

Client: THE WORLD BANK

Date: February 2008 - July 2009

The general objective of this program is the development of CAPRA as a techno-scientific methodology and information platform, composed by tools for the evaluation and communication of risk derived from natural hazards in the region at several territorial levels.

COUNTRY SPECIFIC RISK EVALUATIONS FOR BOLIVIA, GUATEMALA, JAMAICA AND PERU

Location: Bolivia, Guatemala, Jamaica and Peru

Client: INTER AMERICAN DEVELOPMENT BANK (IADB)

Date: July 2008 - March 2009

The main objective of the risk evaluations was to provide robust analysis that allow the identification of important disaster risk issues in the context of four countries development priorities and oriented the setting of risk management priorities.

HYDROMETEOROLOGICAL RISK EVALUATION SYSTEM FOR INSURED ASSETS IN THE MEXICAN REPUBLIC

Location: México City

Client: MEXICAN INSURERS ASSOCIATION (AMIS)

Date: January 2006 - June 2007

Development of a probabilistic loss model and a modeling application, to hydro meteorological phenomena. This application analyses risk on building portfolios to hurricane hazard (wind and storm surge), tsunami, hail and flood. Main results are Average Annual Loss and Loss Exceedance Curve. Losses are calculated including direct and indirect effects. The application is in Visual NET platform and was designed for the insurance companies. Integrated models are rigorous, probabilistic and based on multiple hazard scenarios, for which damage is evaluated according to a set of vulnerability functions proposed for this assignment. The results were compared to the losses reported by insurance companies to hurricanes such as Wilma (2005), Stan (2005), Kenna (2002), Isidore (2002), Pauline (1997) and Gilbert (1988), among others.

MANAGUA SEISMIC VULNERABILITY STUDY

Location: Managua, Nicaragua
Client: INETER, DMI, WORLD BANK
Date: March 2004 - July 2005

The main objective was to prepare damage and loss scenarios for all the existing building inside a perimeter which covers almost 80% of the city extension. The selected hazard scenarios were earthquakes that produce losses equivalent to those expected for 100 and 500 years return period, and a scenario equivalent to the December 1972 Managua earthquake.

REVIEW AND UPDATE OF THE NATIONAL CONSTRUCTION CODE OF NICARAGUA

Location: Managua, Nicaragua
Client: TRANSPORT AND INFRASTRUCTURE MINISTRY (MIT)
Date: January 2004 - June 2005

The main objective was to review and update the general guidelines of structural design for new constructions in Nicaragua. The existent building code was an adaptation of the 70's decade American UBC, then, the objective was to incorporate knowledge and experience on natural hazards assessment present in building codes from other countries in the region. Seismic hazard was evaluated and design spectra were proposed based on realistic shapes that consider the structural behavior at large periods.

SERN SYSTEM FOR FAST ASSESSMENT OF NATURAL RISK

Location: Mexico City
Client: GNP INSURANCE
Date: May 1999 - May 2000

Development of a software application for risk assessment to different natural hazards (earthquake, wind, flood, volcanic eruptions, etc.).

PML-ERN SYSTEM FOR SEISMIC RISK ASSESSMENT IN THE MEXICAN REPUBLIC.

Location: Mexico City
Client: INSURANCE COMPANIES OF MEXICO
Date: August 1997 - August 1999

The main objective was the development of a software application for seismic risk and loss assessment of exposed assets, for insurance purposes. Currently the system is used by 37 insurance companies. A special version of the software was issued for the National Commission of Insurance and Bonding of México for regulation purposes.