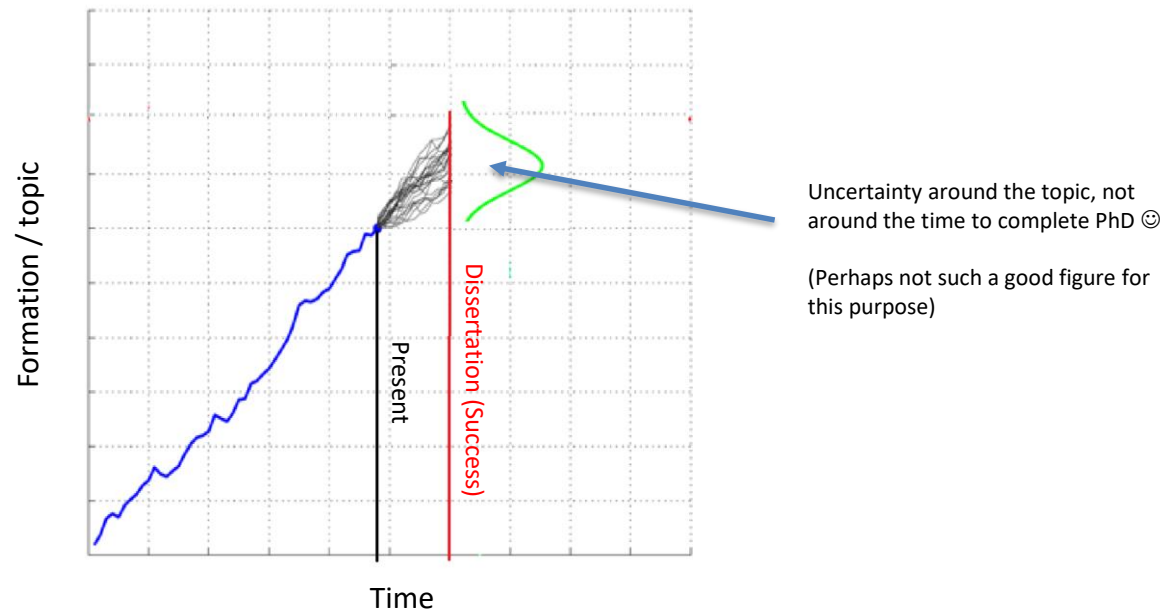# Project and self- Introduction

RAMS seminar

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Agenda

- Diagnosis
  - Background
    - Academic formation, industrial experience.

- Prognosis
  - PhD position

Uncertainty around the topic, not around the time to complete PhD ☺

(Perhaps not such a good figure for this purpose)

Origins - Venezuela

- Official language: Spanish
- Capital and largest city: Caracas
- Population ~= 32 millions
- One of 17 megadiverse countries (more than 5000 plant species as endemic + marine ecosystems)

Punto Fijo – Paraguaná peninsula

Origins - Paraguaná

Paraguaná refinery complex

No.	Name	Location	Barrels /day
1	Jamnagar Refinery	Jamnagar, India	1.24 million
2	Paraguana Refinery Complex	Punto Fijo, Venezuela	955 000
3	Ulsan Refinery	Ulsan, South Korea	840 000
4	Yeosu Refinery	Yeosu, South Korea	775 000
5	Onsan Refinery	Ulsan, South Korea	669 000

Source: http://www.hydrocarbons-technology.com/features/feature-top-ten-largest-oil-refineries-world/

Education

UNIVERSIDAD SIMÓN BOLÍVAR

Mechanical Engineering (5 years program)

- Basic: Math, Physics, others.
- Materials science.
- Fluid mechanics, Thermodynamics, Heat transfer.
- Metal fabrication processes.
- Dynamics, mechanical vibrations.
- Turbomachinery.
- Others.

Two internships:
- Short - Summer / Elective course
- Long / Thesis

Summer internship

- Sumer internship – Petrozuata

Joint venture ~ 51% ConocoPhillips ~ 49 % PDVSA

- Upgrader (facility to upgrade Extra-Heavy crude oil to synthetic crude oil)
    - Department of reliability
    - Inspection group – Rotating equipment

- Learning outcomes:
    - ISO 10816 – Mechanical vibration – Evaluation of machine vibration by measurements on non-rotating parts.
    - Risk Based inspection
    - Root cause analysis – Fault trees
    - Others

Thesis / Industrial Internship

- Before: Ameriven

  ~40 % ConocoPhillips
  ~30 % Chevron
  ~30 % PDVSA

Now: PDVSA – Petropiar

~70 % PDVSA
~30 % Chevron

- Upgrader
  - Project ~: "Mechanical integrity assessment of fired heater tubes"

Delayed coker heater

API 530 – Calculation of Heater-tube thickness in Petroleum Refineries
- Annex A. Estimation of Allowable Skin Temperature, Tube Retirement Thickness and Remaining Life.
- Creep-rupture
- Online data (tube thermocouples, pressure transmitters) + Inspections reports (thermography)

Learning outcomes:
- Uncertainty - Probability distributions
- Montecarlo simulation
- Others

Work experience 1

USB – Research and development foundation (Fundación de Investigación y Desarrollo)

Private corporation. Brewery, food processing and packaging, others

Project SIGEMA (Sistema de Gestión de Mantenimiento) / Maintenance management system

- Implementation of Reliability Centered Maintenance

  - Piping and Instrumentation diagrams (update / create)
  - FMECA
  - SAP PM (Plant Maintenance) – SAP MM (Material Management)
  - Maintenance packages, procedures, spare parts, tools, amount of hours, so on.
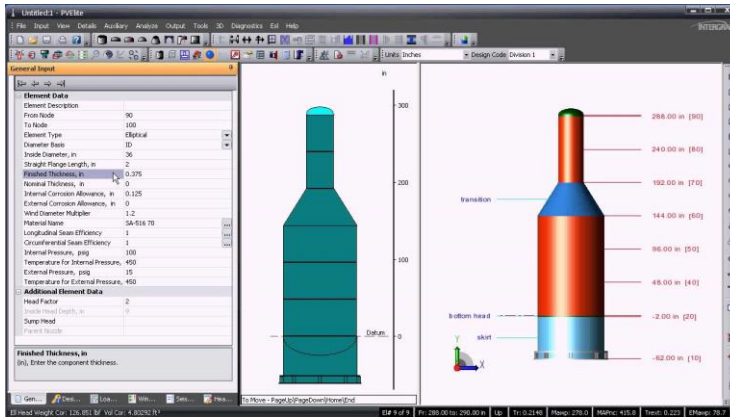
Work experience 2

Back to..

PDVSA
Ingeniería y Construcción

Engineering, Procurement and Construction - Subsidiary

Project engineer (design) – Mechanical engineering discipline

- Static equipment: pressure vessels (distillation columns, reactors, separators, heat exchangers), atmospheric tanks.

PV Elite

Learning outcomes:
- Design and drawing software
- Codes, standards: ASME, API, ASTM, PDVSA

Road to NTNU

- Project with partner company in Spain "Técnicas Reunidas" - EPC

- First visit to Norway in dec. 2014 (Stavanger)

- Google: "Reliability", Norway,
    - Do you mean: Master of Science (MSc) in Reliability, Availability, Maintainability, Safety, NTNU ?
        - "Yes"   / Application deadline ~ January 15.

- Submitted thesis, june 2017

"Hybrid Modelling for Dynamic Reliability Assessments is Subsea Oil and Gas Processing Systems"

Supervisor: Mary Ann Lundteigen
Co-supervisor: Anne Barros
                        Hyung Ju Kim
                        Andreas Hafver (DNV-GL)

PhD position

Prognosis and Maintenance Optimization for Critical Infrastructures

- – Supervisor: Anne Barros
- – Co-supervisor: Jørn Vatn

- Co-tutelle agreement
  - – UTT - University of Technology of Troyes. France

Main objective:

- To study, develop and demonstrate quantitative models for prognosis and maintenance optimization of critical infrastructures.

Strong collaboration with the Norwegian Public Road Administration

Statens vegvesen

PhD position

- Focus on stochastic and statistical approaches
  - Stochastic degradation modeling
  - Parametric and non-parametric approaches
  - Maintenance cost assessment with Monte Carlo

- Challenges
  - Current data bases characterized by a mixture of quantitative and qualitative information
  - Censoring, incompleteness and pollution by maintenance actions

Literature study → Development of new models → Models validation and dissemination
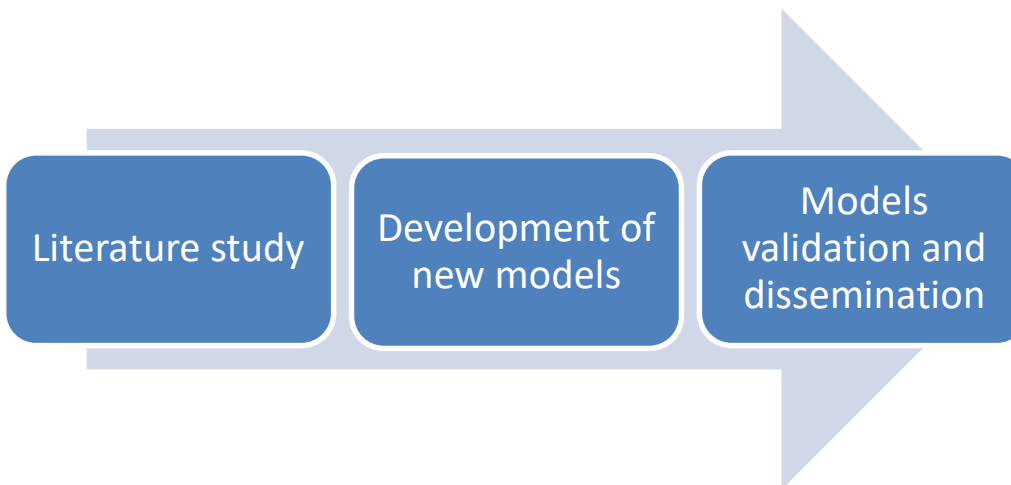
For now, literature study:

- Condition based maintenance in civil engineering

- Advanced statistical estimation techniques for stochastic processes.

Short term

- ESREL 2018 conference paper

Markov chains for deterioration modeling of a bridge girder surface.

- How to estimate parameters from available data with mentioned challenges.
- How formal expert judgement approaches may be used to elicit the models parameters.
- Show potential improvements in the inspection regime based on the probabilistic model

Smart bridges
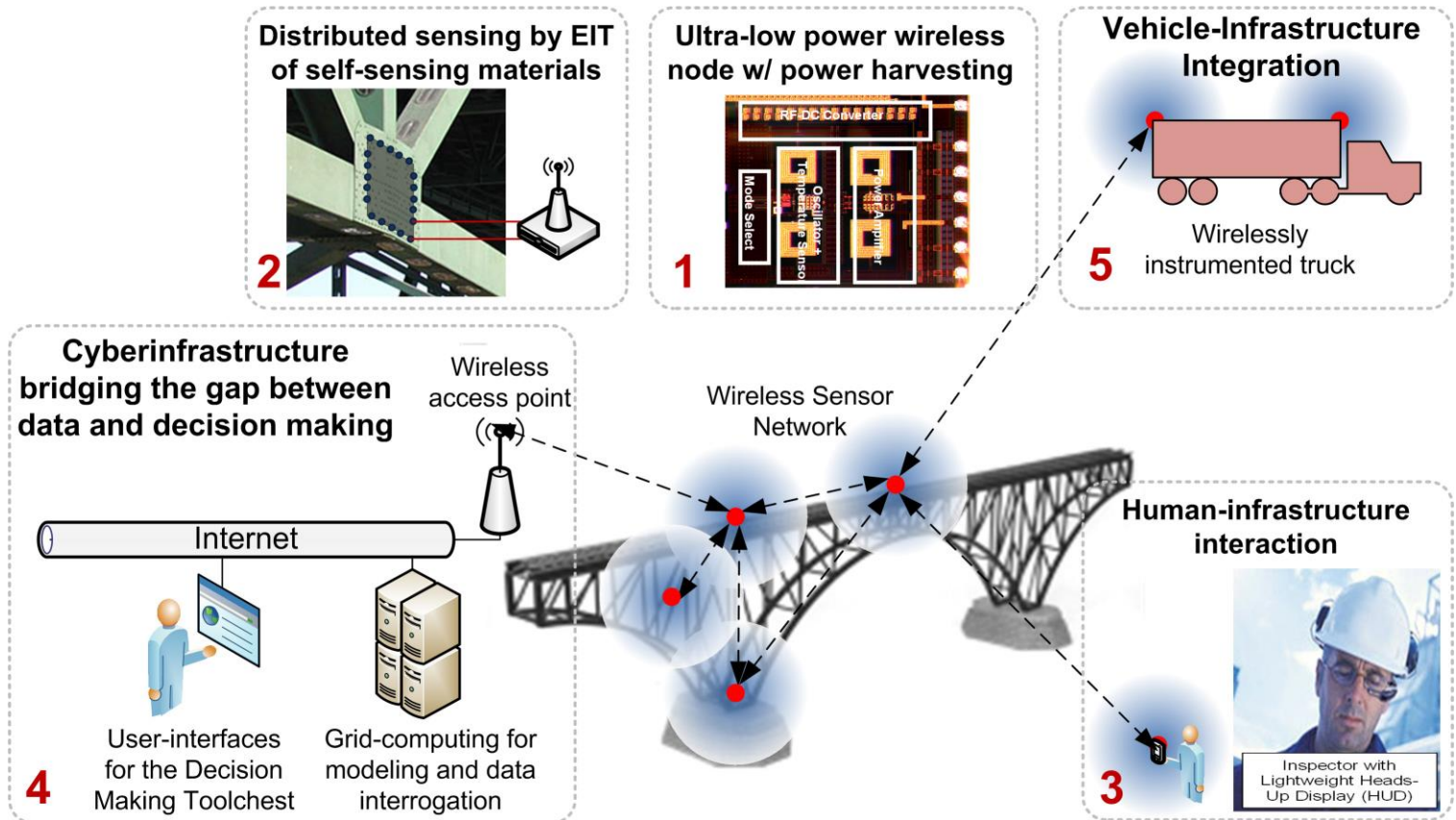
Source: http://www.labspaces.net/94799/Smart_Bridges_Under_Development_with_New_Federal_Grant