

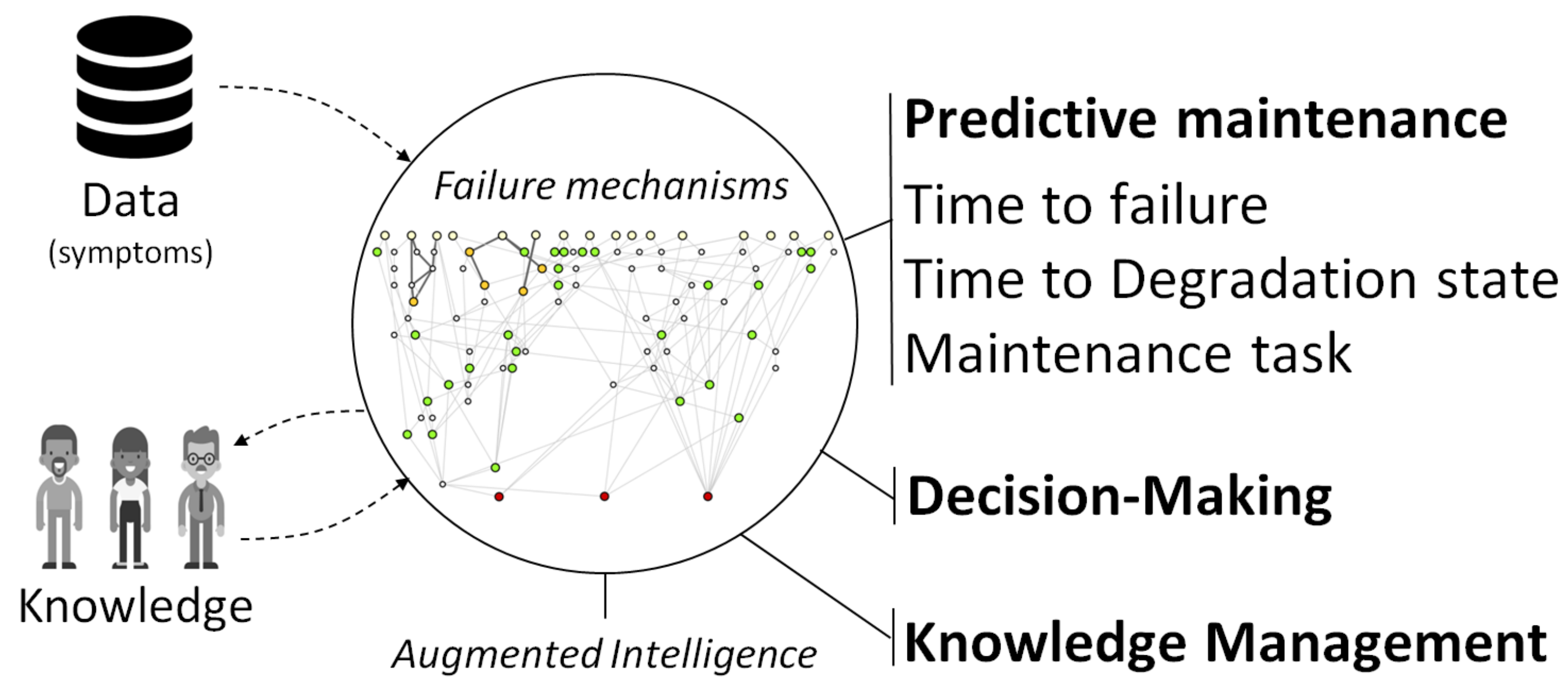
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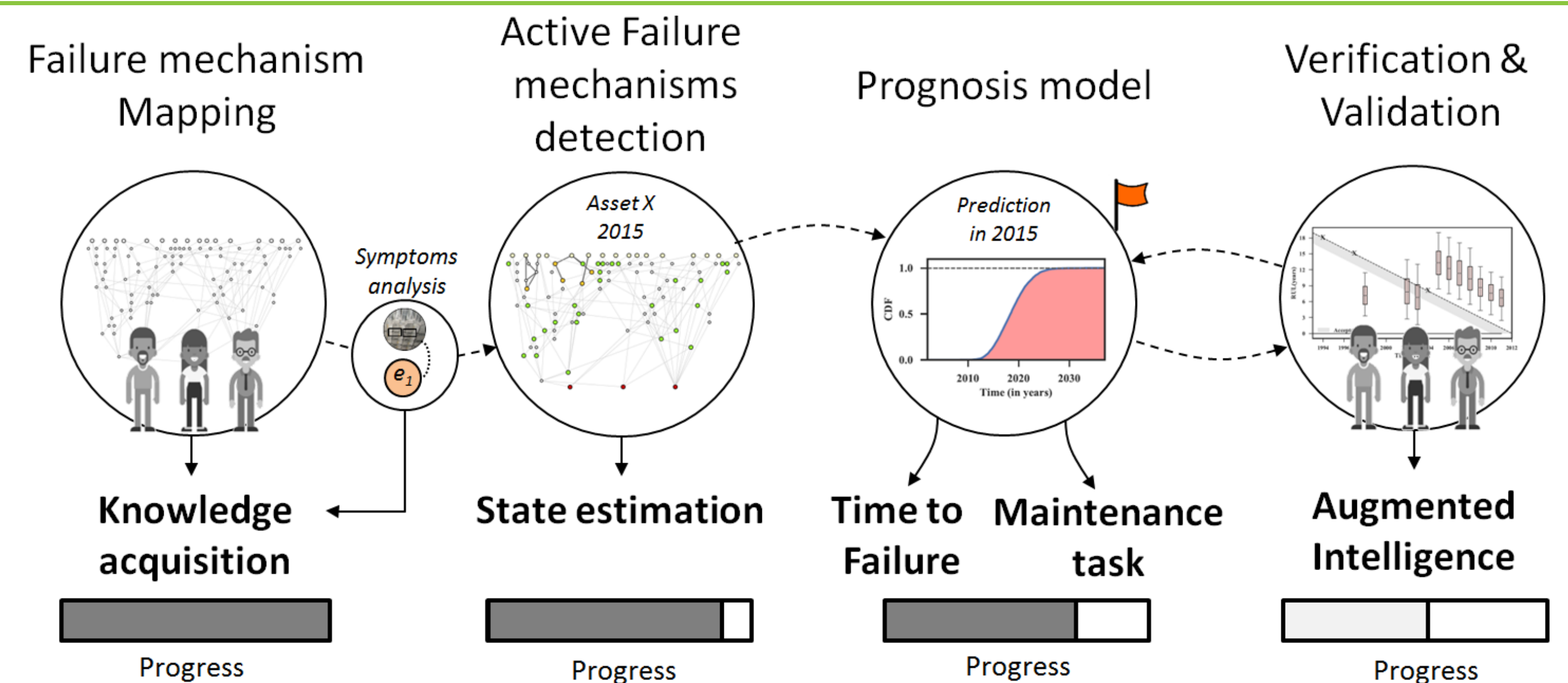
Research Objective



Expected Contributions

- Provide a system view of different failure mechanisms leading to failure modes.
- Enable to predict multi-failure modes occurrence dynamically on heterogeneous sources of diagnostic data.
- Ability to identify failure mechanisms that are not detectable based on diagnostic tools performed.
- Predict some specific maintenance actions based on detecting active failure mechanisms.
- Knowledge management and interdisciplinary expertise gathering.

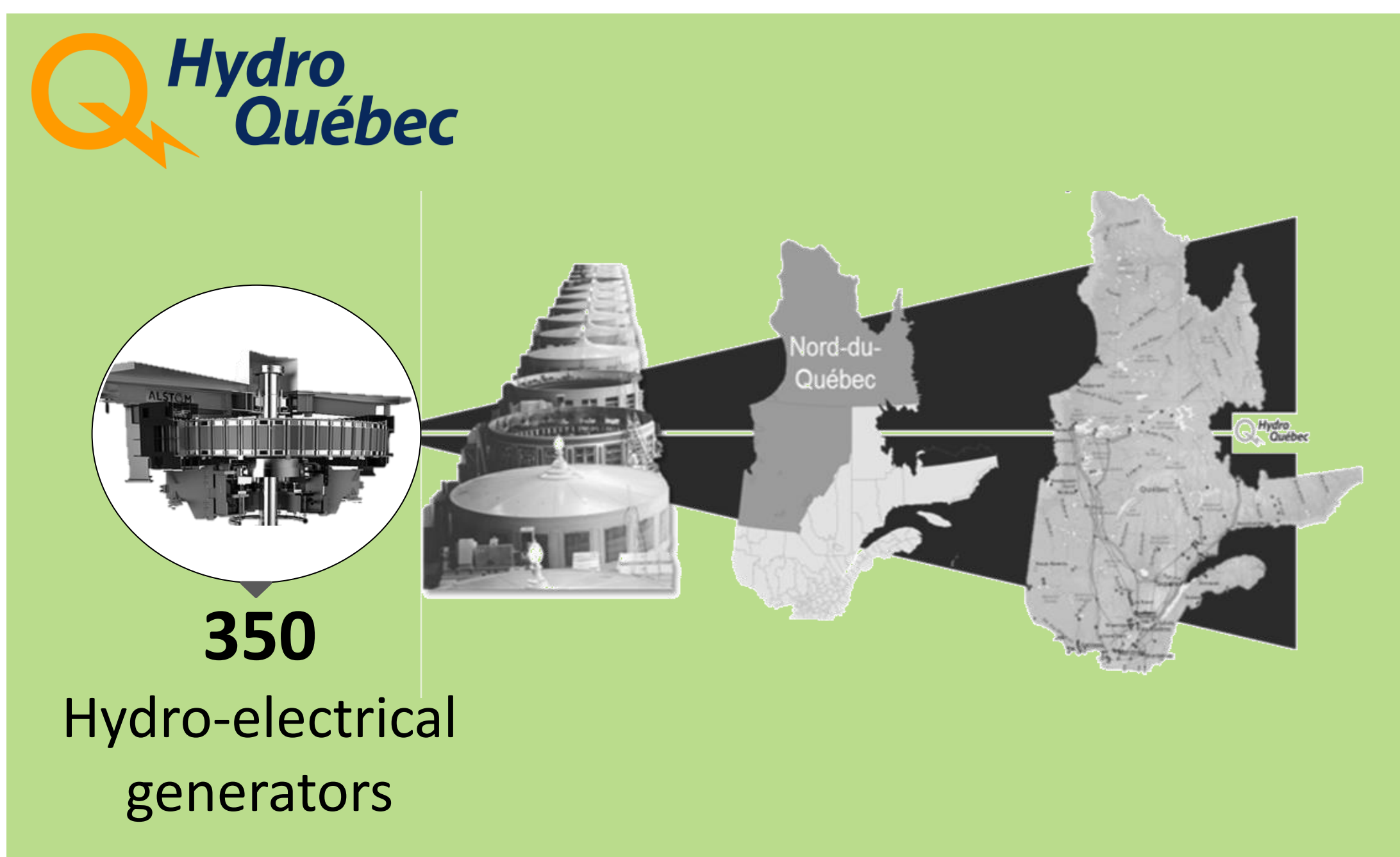
State of Research



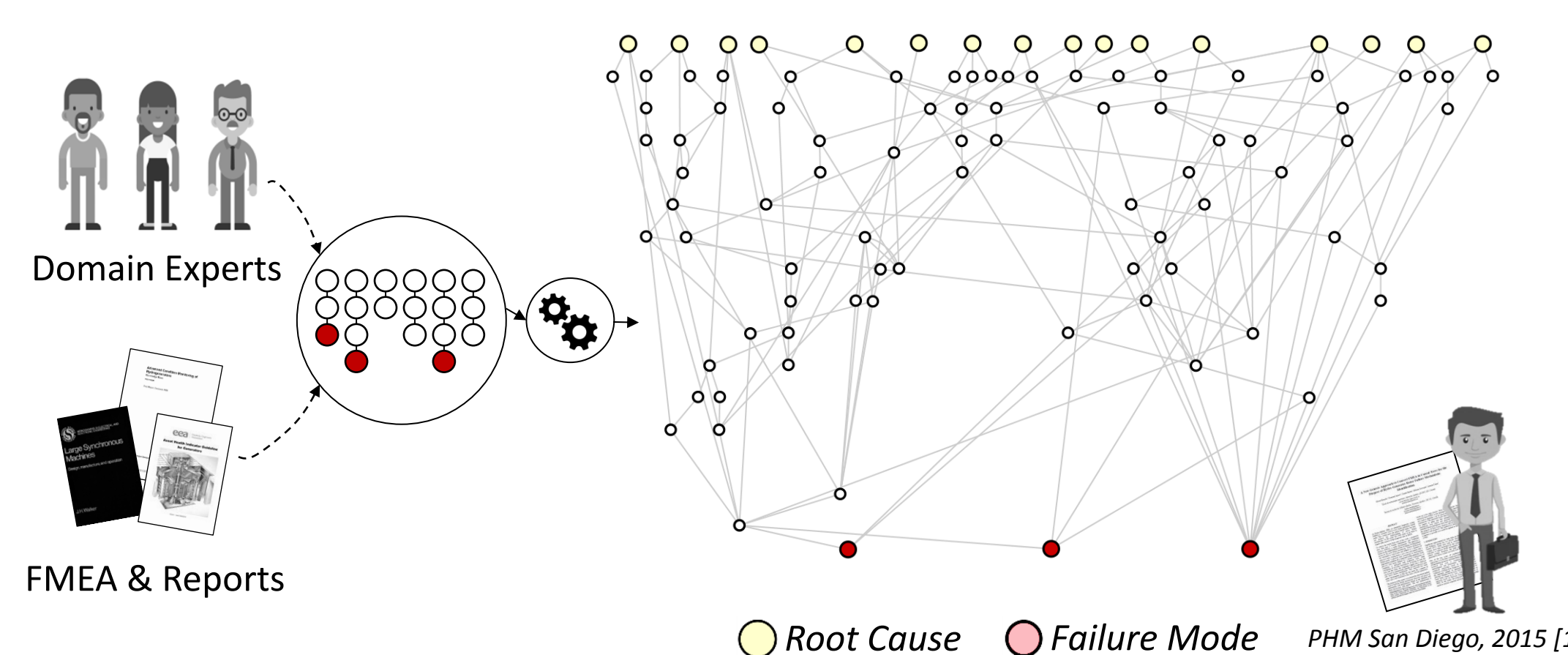
Next Steps

- Improve prognostic algorithm based on experience feedback gained from real historical case studies on hydrogenerators.
- Make algorithm decisions comprehensive for users.
- Develop performance metrics for reparable equipment and fleet-based prognostic algorithm.
- Explore the concept of Augmented Intelligence.
- Explore the influence of maintenance actions, operation and environment loads on prognostic.
- Explore machine learning algorithm to estimate model parameters.

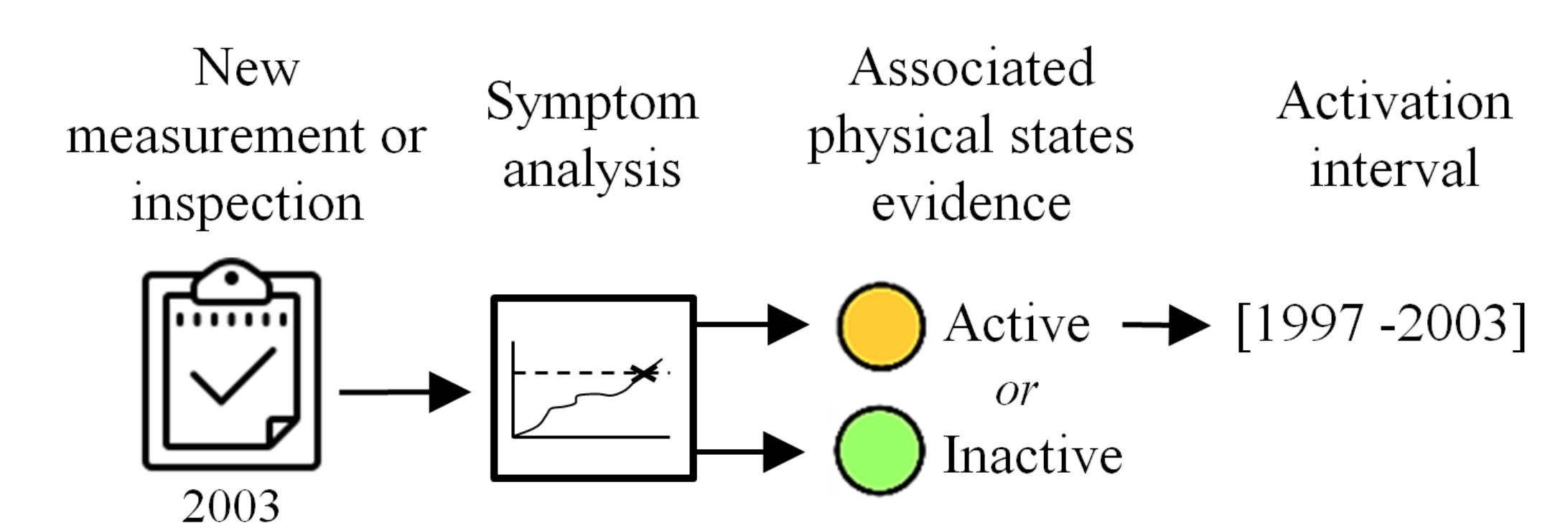
Research Details



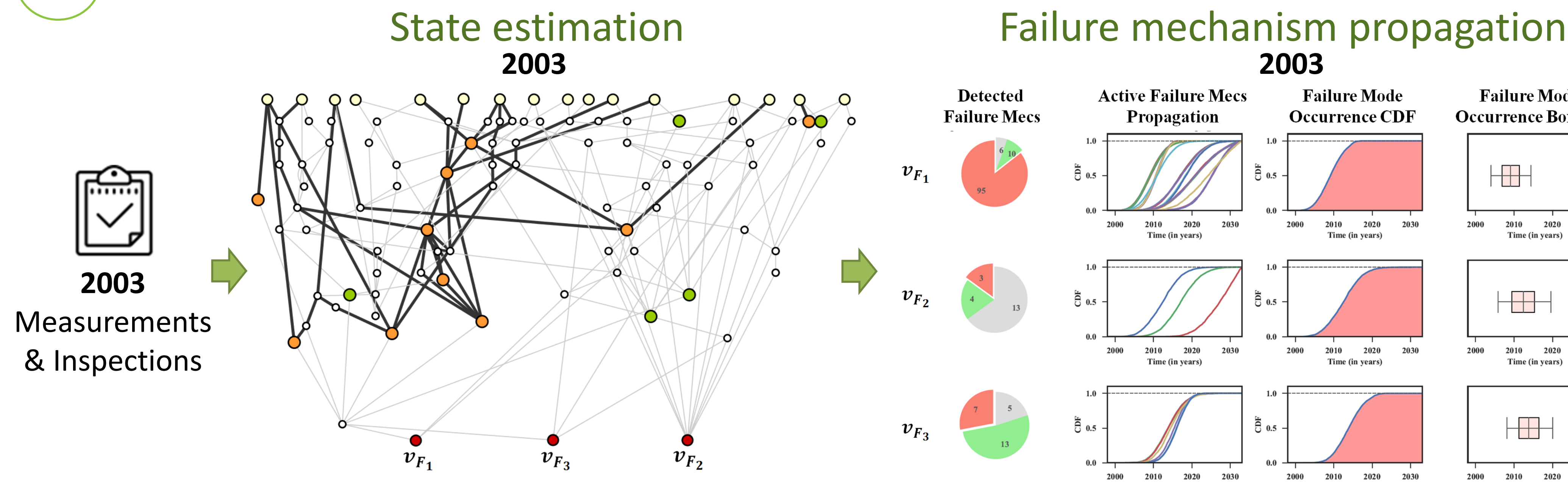
1 Failure mechanisms mapping



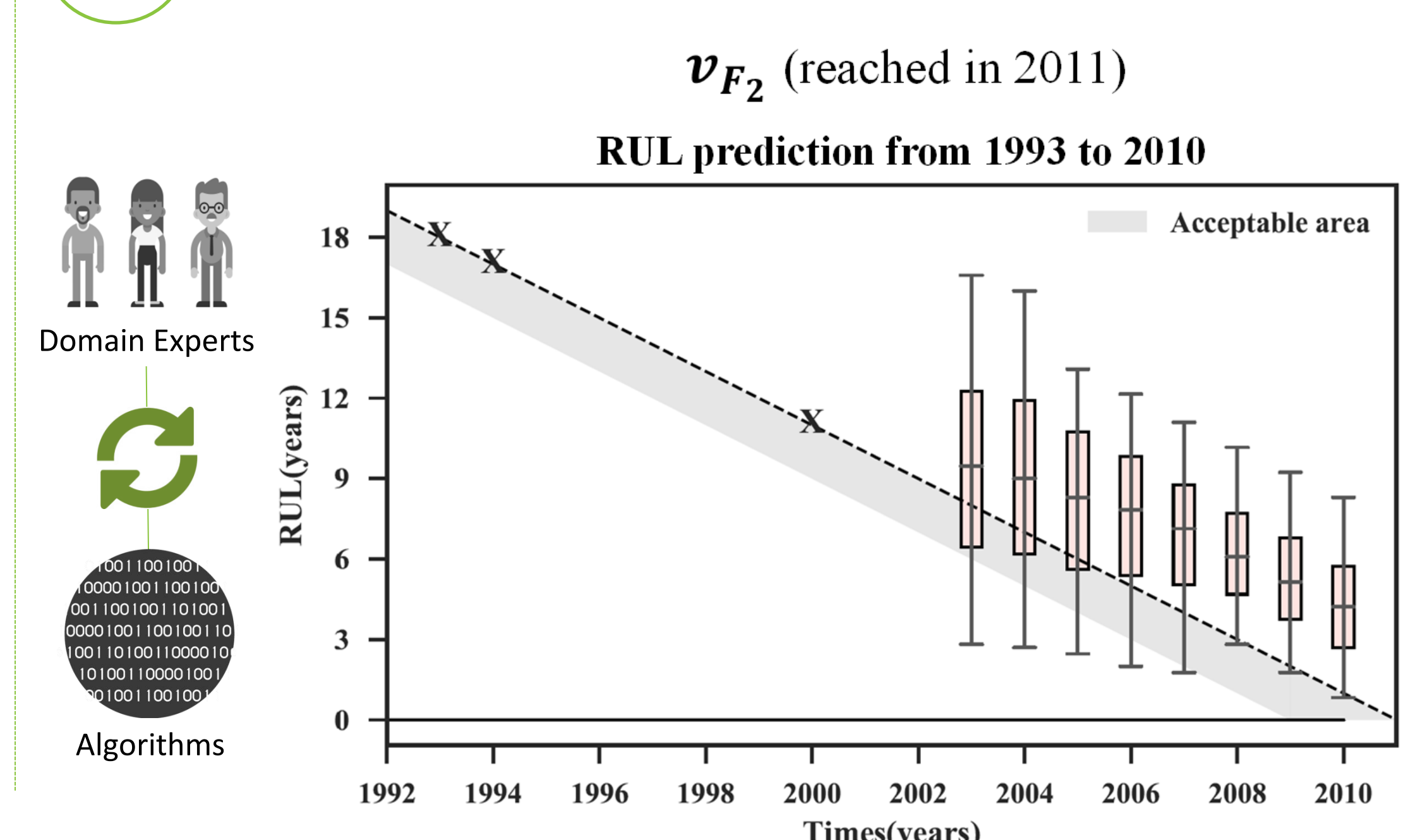
2 Fault detection algorithms



3 Failure prognosis algorithm



4 Verification & Validation



Acknowledgments and References

The work is fully supported by the Hydro-Québec Research Institute (IREQ), in Varennes, Québec, Canada and by the MITACS scholarship program.

[1] O. Blancke, N. Amyot, C. Hudon, M. Lévesque, and A. Tahan, "A New Generic Approach to Convert FMEA in Causal Trees for the Purpose of Hydro-Generator Rotor Failure Mechanisms Identification," in *Annual Conference of the Prognostics and Health Management Society*, San Diego, CA, US, 2015