GO-VIKING: managing vibration impact in nuclear power plants

Gathering expertise **O**n **V**ibration **I**mpa**K**t **I**n **N**uclear power **G**eneration

GO-VIKING is a Horizon Europe initiative bringing together some of the best expertise in fluid dynamics, flow-induced vibration (FIV) phenomena, and structural integrity of key Nuclear Power Plant (NPP) components all over the world. It aims at improving the operation and safety of contemporary nuclear power plants and the design evaluation of new reactor concepts.

TITAN Test Section

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OBJECTIVES

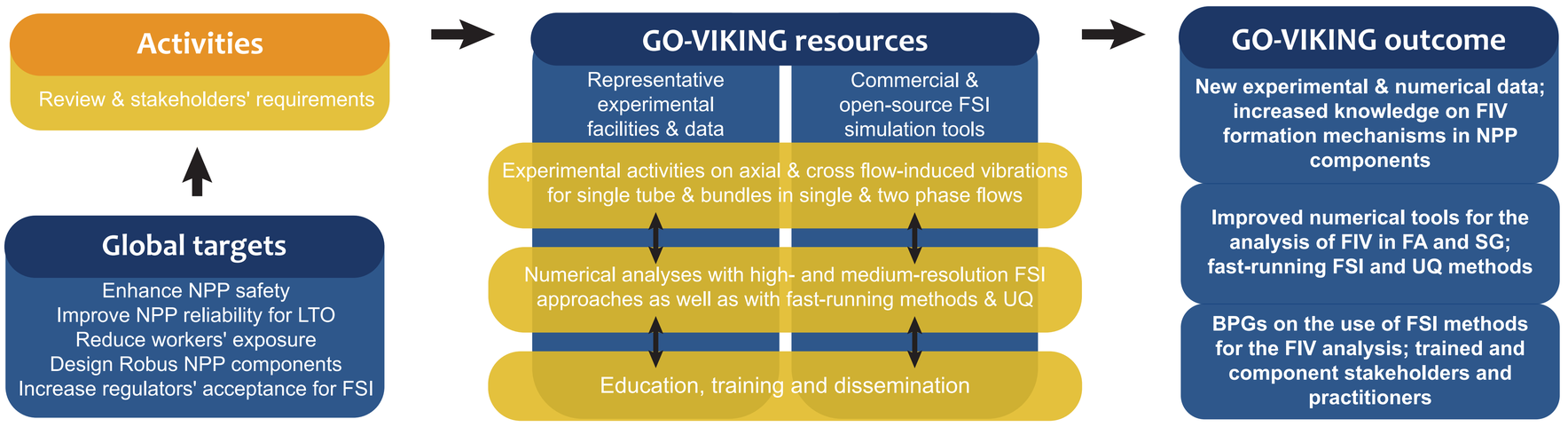
- Generation of new experimental and high-resolution numerical data, relevant for nuclear fuel assemblies and steam generators
- Provision of validated fast-running fluid-structure interaction (FSI) tools with uncertainty quantification methods
- Training of stakeholders and graduates in numerical FIV analysis
- Expanded knowledge on efficiency, accuracy and reliability of FSI methods
- Synthesis of best practices for FIV analyses
- Highly increased expertise of and awareness on FIV phenomena in nuclear power plants

CONCEPT

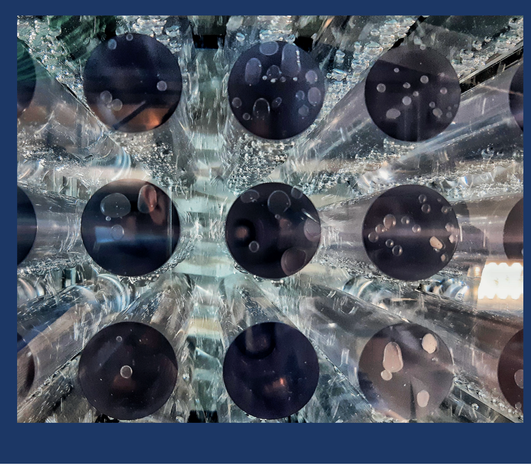
Using input from literature and stakeholders, generate state-of-the-art new high resolution experimental and numerical data to develop and benchmark, sophisticated 3D FSI tools for FIV evaluation.

The validation and benchmarking of the FSI tools will be done using six state-of-the-art experimental facilities equipped to measure both crucial flow and vibration data

The gained experience and know-how throughout the whole project will be synthesized in a single document that will provide the stakeholders with best practices on the use of FSI methods for the analysis of FIV

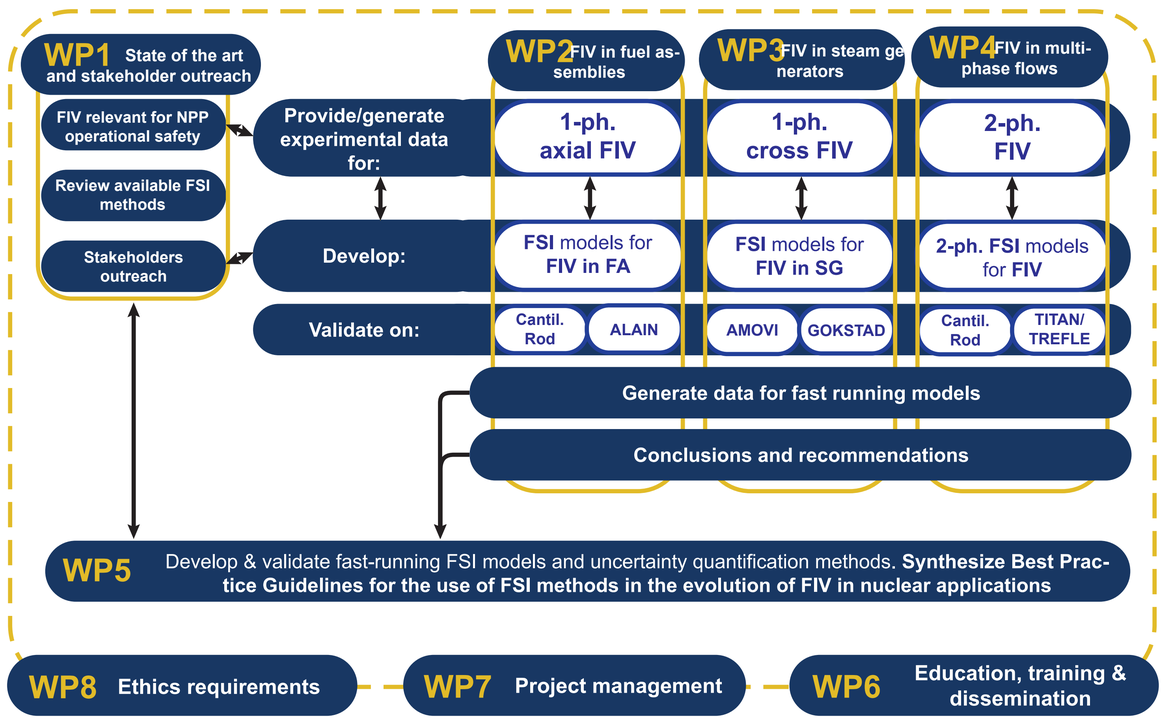


TREFLE Test Section



STRUCTURE

WP1 - State of the art and stakeholder outreach
WP2 - Flow-induced vibrations in fuel assemblies
WP3 - Flow-induced vibrations in steam generators
WP4 - Flow-induced vibrations in multiphase flows
WP5 - Fast-running methods, uncertainty quantification (UQ) and best practice guidelines
WP6 - Education, training and dissemination
WP7 - Project management
WP8 - Ethics requirements



IMPACTS

- The improved normal operation of current reactors through less fuel rod and steam generator tube leakages will lead to shorter and less plant outages, increased plant availability and lower staff exposure.
- The reduced probability of steam generator tube rupture accidents will enhance reactor safety.
- The increased structural integrity of key components (fuel rods, steam generator tubes) will support the nuclear operators in Europe to successfully realize their power uprate and long-term operation programs.
- Developing accurate and efficient FSI tools and methods, while training experts in their application for FIV will highly increase the understanding of such phenomena in nuclear reactors.
- Community building and networking between academia and industry will further enhance the knowledge.
- The developed modern and general purpose FSI tools will support vendors in the design, and operators in the deployment of innovative nuclear systems.

PARTNERS

GRS, NRG, Universiteit Gent, LGI sustainable innovation, EDF, TU Delft, VTT, framatome, IRSN Institut de radioprotection et de sûreté nucléaire, von Karman Institute for Fluid Dynamics, IPP Centre, enen, Vattenfall, cea, PennState, Virginia Commonwealth University RPI, EDF*, Manchester 1824 The University of Manchester

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DURATION

June 2022 –May 2026

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