

FDIR: state of affairs

ADCSS 2015 – Wed 21 Oct – PM; session convenors:
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Objectives of this session



The purpose of this session is to assess *the current state of practice in industry* and *state of the art in academia* with respect to FDIR, both in terms of *effective analysis and design methods* and *process support* for *spacecraft engineering* as well as *independent verification and validation*.

Follow-up to similar survey performed at ADCSS 2011, outcome:
FDIR development generally seemed to lack a systematic approach as part of the core architectural concept rather than an add-on approach to the nominal spacecraft capabilities, eventually leading to unjustified increase in the FDIR complexity.



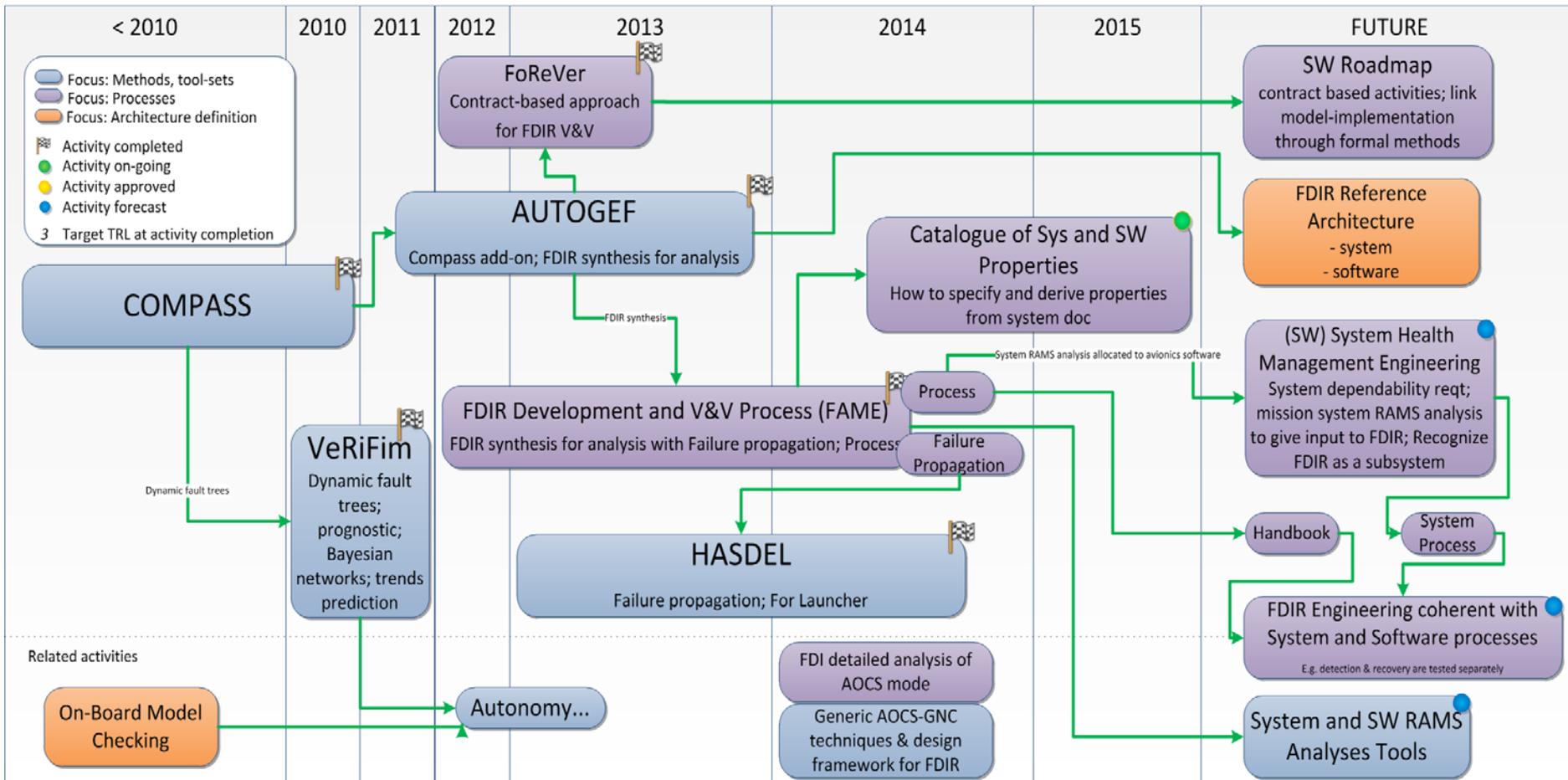
- FDIR “**emerge**” from the engineering process by necessity rather than by conscious intention → no dedicated process, no support tools
- For each mission, the “general logic” is twisted to fit the numerous **particular cases** that are discovered when running scenarios → uncontrolled design
- The system FDIR concept and the software FDIR component claim to have a “general logic” (e.g. reconfiguration levels), but happen to be a **toolbox** to monitor and reconfigure more or less everything → over design
- The **verification** of the system FDIR is difficult and requires tuning (usually experimentally) a lot of parameters in the software FDIR component → cost and delay in integration
- FDIR is the “complexity sponge” with major impact on AOCS, software and V&V

- Support FDIR process with a model based approach
 - Tools are required to manage this complexity
 - Support early analysis and to enable reuse
 - Fully embedded in the engineering process

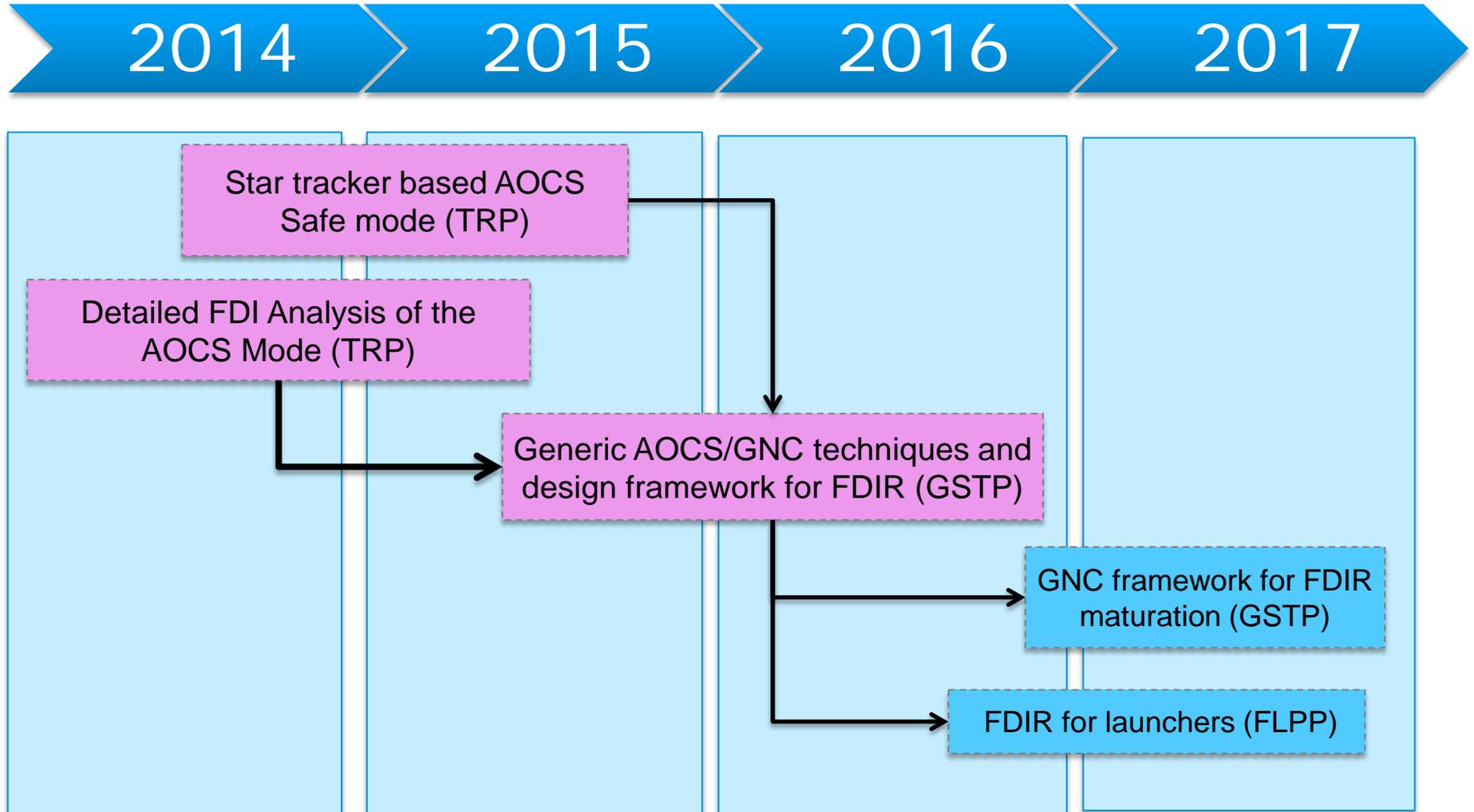
- Create an FDIR community:
 - Exchange experiences, identify best practices, identify potential tool and process needs and improvements
 - Consolidate knowledge: towards FDIR handbook

- Establish FDIR as an engineering discipline
 - Unification across industry to further support interoperability (through SAVOIR and ECSS)
 - Provide means to better support ISVV early in the life cycle

TEC-SW activities roadmap



TEC-EC activities roadmap



1. State of practice in European industry
 - OHB (Brahm, Tipaldi)
 - TAS (Pasquet)
 - AIRBUS (Lautenschlaeger)
2. FDIR in micro-satellite avionics (Lianxiang)
3. FDIR in networked systems: the LCM approach (Martignano)
4. State of art in European academia
 - FBK (Cimatti, Bozzano)
5. Panel discussion (chaired by Oganessian and Girouart):
 - What level of progress has been achieved since ADCSS 2011?
 - What challenges remain to be addressed?
 - FDIR does not stop at company borders: what type and what level of coordination is required across the space industry?

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Yes, there has been progress, but

1. Processes must be further improved and consolidated
2. Clear need for common terminology across industry
3. The main challenge remains to be FDIR verification
4. Tools are considered essential but not yet sufficiently robust or lacking integration with other engineering tools