

SU2 Foundation

Industry Perspective

SU2

Industry alias with the Foundation

- **Industrial Affiliates: how to become a member?**
 - Contribute funds to the Foundation
 - Contribute modules to the SU2 software
 - Use and promote usage of the software
 - Having a general interest in the status and development SU2
- **How does this affect rights of the affiliates?**
 - Election of industry's representative on the board, decisions within the industry affiliated group, etc.
- **Some criteria need to be defined**

Industry: Assessment SU2 Today

Sweet spots to keep/strengthen:

- Access to a working Adjoint-based optimization with all required components
 - Industry strives for efficient optimization technique that is applicable in real-world projects
- No licensing issues for large scale operation
 - Significant money saver
- Satisfactory performance, including for transient models and good scalability.
 - A fair vehicle for mass production of parametric studies

Industry: Assessment SU2 Today

Sweet spots to keep/strengthen (cont'd):

- Mature Open-Source-Software (OSS) with active world-wide community
 - A reliable, well-tested apparatus that is likely to be around tomorrow
 - Well-established network of experts for collaborations
- Investment of efforts in a technology and software that are at the state-of-the-art
- Not to waste time and funding on repeating the development of existing techniques just because we do not have them
- Ability to recruit new entrants / students already trained in SU2

Industry: Assessment SU2 Today

Pain points to remove/improve upon:

- **Industry has difficulties to adapting to an open-source methodology**
 - Deep in the “pay for good product” culture
 - **SU2 has to provide a very appealing value proposition to overcome the very high activation energy required to switch from “standard” tools in the departments (to overcome comfort zone, politics, etc.).** Can be complicated if internally-developed codes already exist that might create competition.
 - Note that you may need to convince the engineers that your software is the best tool for the job technically, but management/legal/IT may be the final decision makers on adoption.

Industry: Assessment SU2 Today

Pain points to remove/improve upon:

- **SU2 performance is just “satisfactory” and in many cases still lags time-to-solution of commercial/other packages**
 - “SU2 is slow” or “SU2 does not converge” are common refrains
- **Concern about malicious hidden software in open-source packages**
 - Somehow irrational, as commercial binary codes are commonly accepted.
 - **Find a way to demonstrate SU2 is clean via static analysis, memory analysis, security tools** (Static Application Security Testing (SAST) such as LGTM.com, valgrind, etc.) in public/regression testing.

Industry: Assessment SU2 Today

Pain points to remove/improve upon:

- **Insufficient documentation and start-up tutorials:**
 - Difficulties is assimilation of the software in design departments, having a mass of common engineers (not software specialists).
 - Insufficient V&V and supporting materials for particular application spaces = value proposition is not clear for many industries.
 - Some published examples with external aeronautical cases being the most visible, but not well organized or comprehensive. Should be clearly documented and correlated to releases. **A big opportunity for academic groups to obtain exposure exists by providing docs/tutorials but is not being capitalized on yet.**

Industry: Assessment SU2 Today

Pain points to remove/improve upon:

- **Insufficient documentation and start-up tutorials (cont'd)**
 - Make it easier to transition interested technical engineers to development:
 - Provide modular components such as custom BCs, structure for easily adding equations, config parameter, etc.
 - Developer tutorials and theory guide would be effective (beyond user tutorials).

Industry: Assessment SU2 Today

Pain points to remove/improve upon:

- **Error messages and issues identifications are incomplete.**
 - Missing consistency test of case setup
 - Non-expert users commonly find themselves facing unexplained failures with no clues how to resolve the issues
- **No reliable support base that resolve issues on a fast response procedure**
 - Industry needs answers here and now. Every bottleneck in a big project costs fortunes

Industry: Assessment SU2 Today

Pain points to remove/improve upon:

- **Missing option to fund specific modules or projects at the Foundation**
 - Aiming at specific internal objectives, expecting to fund the crucial missing technologies for specific industry projects
- **Apprehension that contributions will be used by competition**
 - In the current fiercely-competitive industrial world, each player tries to keep any efficient tool and technology for their own exclusive use only. Reluctance to invest in common benefit.

Crucial/Important Issues for Industry

- Longevity of the software provider/foundation
 - Not to waste large investments that were made in acquiring work practice with a certain tool
- Having no limitations on using the software
 - As is or coupled by local developed modules for any foreseen future (also internationally).. suggests that improved software interfaces for “modules” would be highly desired by industry for customization while protecting IP
 - Ability to develop internal-usage restricted modules that can become part of the OSS
 - Ability to put on markets systems that include the OSS (or part of it) without limitation
- Safeguards against a possible future third-party claim of rights on products that were developed using the OSS

Crucial/Important Issues for Industry

- Involvement/influence in the future software development
- Interaction with active, responsive and up-to-date support group
 - Ability to support cases setup and identify users' errors and best practices
 - Ability to identify software bugs (encountered by the users) and provide adequate patches
 - Help/support in setting up new projects
 - Tutoring new users (web based/in-live tutoring) classes (per-payment)
 - Willingness to take as a contractor the development of specific projects for users
 - Will the product be owned exclusively by the ordering industry or will it become part of the open-source package?

Crucial/Important Issues for Industry

- Portability and easy access/installation
 - Avoiding network/firewall issues, make for easy IT approval
 - Support many hardware configurations
 - Outdated software stacks (typically) on HPC resources or workstations lagging behind latest available can cause issues

Crucial/Important Issues for Industry

- Clear releases/versions from the (single) main development line so that prior results for industrial applications can be archived and recreated down the line if audited (**comparability**).

Crucial/Important Issues for Industry

- Different legal interpretations and risk appetite for OSS by country/region/company.
 - Companies desire minimization of risk related to loss of know-how (IP), liabilities, and possible reputation damage incurred by using/contributing.
- Legal dept./Management/IT typically give final clearance on whether particular (OSS) software can be used. To encourage industry adoption of SU2, lower barriers/risk wherever possible:
 - Provide clear documentation of all licenses found within the project and check for incompatibilities or undocumented components (or any accidental copy-paste).
 - Provide clear guidelines for how to contribute in the GitHub repository and how to document the contribution. Standard practice is including a CONTRIBUTING file in root of repo and a NOTICE file (or similar) containing all verified copyright holders/authors.

Industry: Relationship with the Foundation

How the foundation can support industry:

- Provide adequate and effective tool for real world applications
- Get involved in specific projects for the benefit of a specific industry
- Provide support, tutoring and direct help to the users at the industry
- Adopt new venues or implement more efforts in existing tools to match the requirements and needs of certain industries
- Facilitate exchange of talent and research between all 4 pillars (newsletters/promotional materials, internships/jobs/recruiting, etc.)

How industry can support the foundation:

- Surfacing the industrial needs and requirements, different from academic nature is important for the code development
- Directly fund certain development activities, needed by a specific industry
- Contribute funding for the general development of the software
- Directly contribute to the software to “industrialize” the code
- Perform joint R&D whenever possible (publications, joint code development, etc), and provide additional in-kind contributions to project

Industry: Proposal for Action

The following foundation programs/services/committees are recommended by the industry group (group does not formally exist yet...):

- Prepare a recommendation for the “industry affiliation” bylaws, that will be discussed, modified and finally ratified by the board of directors
- Support the recruiting efforts of industrial companies (together with the other groups, especially the academia representatives)
- Summon a discussion in the board for setting a clear policy: how to advertise and solicit industrial partners into this affiliation, including honing value proposition for why companies should become a sponsor (what can companies expect for investment?).
- Installing an industry consultation committee that will be involved and suggest venues for new capabilities to be developed
- Be a part of a maintenance /support committee (together with the developers representatives) that will make suggestions about improvements and capabilities developments in these aspects
- Recommend the foundation to create committee(s) or focus attention on: V&V activities, documentation/support/maintenance programs, and OSS/Compliance topics (with legal support)