Open source or not? It depends

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- Open versus closed source is a choice to be made on what one is providing and what one would like to have

Scientific software is a continuum of open source, access possibilities

Open source, e.g., WarpX, OpenFOAM, Synergia, Trilinos, PETSc	Restricted access, Osiris, EPOCH	Open engine, e.g., RSim, OpenFOAM	Source license, e.g., LSP	Closed source, e.g., CST, VSim, MARS, COMSOL
FNAL Tech-X RadiaSoft		Tech-X RadiaSoft		FNAL Tech-X RadiaSoft

- Open source: one of the approved open source licenses applies to the entire code base
- Open access: downloadable with no registration
- Restricted access: downloadable upon satisfying some requirement (institution, MOU)
- Partially open source
  - Open engine: Interface is closed, engine is open source
  - Open core: Core features are open
- Source license: conditions (monetary, other) for access to code base, can modify
- Closed source: access as a binary

Institutions of all kinds provide under all kinds of licenses

When is open/closed source provided?

Open source, e.g., WarpX, Synergia, Trilinos, PETSc	Restricted access, Osiris, EPOCH	Open engine, e.g., RSim, OpenFOAM, Sirepo?	Source license, e.g., LSP	Closed source, e.g., CST, VSim, MARS, COMSOL
FNAL Tech-X RadiaSoft	UCLA	Tech-X RadiaSoft	Voss	FNAL Tech-X RadiaSoft

Institution type?

✓ Funding mechanism!

- Exascale and SciDAC require an open-source license
- Support of CAD geometry, ease of use, extensive documentation requires commercial revenue

Observed correlation

(FNAL, UCLA, RadiaSoft given opportunity to comment)

Reasons for using open/closed source are

License type	Comp. engine	Mod. engine	GUI	CAD (healing)	Physics features	Docs	Funding	Reqs
Open source, e.g., WarpX, Synergia, Trilinos, PETSc	✔	✔	✖	✖	ask, do	lim	Fed	time
Open core, e.g., OpenFOAM	✔	NA	$	$	ask, do		Mix	time
Open engine, e.g., RSim,	✔	✔	✔	✔	eng do	✔	Mix	t/$
Restricted access or Source license, e.g., LSP, Osiris, Chicago	✔	✔	LSP	✖	ask, do	?	Fed	t/$
Closed source, e.g., MARS	✔	✔	✖	✖	ask	?	Fed	?
Closed source comm, CST, VSim, COMSOL, …	✔	✔	✔	✔	Cust dmnd	✔	Mix	$

Notional: subject to correction

What does an open source requirement cost?

- Certain codes (MARS, VSim) not available
- Lose multiple approaches
- No longer have codes that can cross check in plasma acceleration, as one example
- No longer available: CAD, …, delta-f, cut-cell dielectrics (DLA)
- Government pays for everything, no synergistic commercial revenue, which funds new algorithms, geometry, and ease of use

NOTE: only HEP has this open-source requirement. Not present in FES-SciDAC, e.g., which relies on closed-source software for meshing, simulations