



# **Third Party Libraries**

Things to keep in mind for modeling systems  
targeted for operations

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# Motivation

- Third party libraries are powerful tools that make our software packages better
- With the growth of community development paradigms, the numerical community has seen an explosion in the growth of third party libraries
- Acceptable third party libraries have had different meanings in research and operational environments
- Many transition to operations activities have been slowed or stopped as they have modeling systems that depend on libraries that are not available on operational platforms
- This talk is to help developers understand “operational concerns” when trying to determine which libraries to use



# Concerns from an operational point of view

- **Support**

- Modeling systems stay in operations a lot longer than in the research world, so this is a critical issue
- How well supported is this library?
- Does it have a community that can support it if main developer(s) move on ?
- Are there regular updates that keep up with changes in compiler/language standards ?
- Is there someone to reach out to in case of issues?

- **License**

- Critical to have an acceptable license to use
- All libraries installed on operational platform are available for all modeling systems to use
- Restricted libraries are not practical
- Use granted for research is not the same as use granted for operations
- Many cases need written confirmation from license developers for operational use case



# Concerns (contd.)

- **Security vulnerabilities**

- Major concern for highly secure (FISMA HIGH) computing platforms
- Packages listed under Federal database of insecure software (<https://cve.mitre.org/>) are rejected
- Libraries have to be reviewed by security division at NCO to confirm that they will not impact operations
- Installation packages need to be self contained, and should not be reaching out to unapproved websites to download packages
- Underlying packages that a library depends upon should be clearly stated and those libraries also have to go through the approval process

- **Duplications**

- Does an existing available library meet the needs?
- Can new libraries deprecate existing libraries ?



# Final Thoughts

- **Third party libraries are critical** for software development, and we should take advantage of their availability
- **Adding libraries do not come without cost**, and they can make packages harder to port. When deciding on adding library dependencies, think about:
  - Long term support and development
  - Is a similar capability already available
  - Will the license be a problem in the long term
  - Will this be supportable in operations
- **Switch the order** in which we add library dependencies
  - First determine if this will work in operations before adding the dependency to your software
- **Library consolidation/refactoring** should be an ongoing process. Reducing the number of library dependencies saves resources