

SAS Macro Library Management and %library() Macro

Magnus Mengelbier
Managing Director

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SAS macro library management is a simple task that most organizations are confronted with. As the use of macros evolve from repetitive processing to utilities and shareable process components, or even community developed libraries, the task to manage macro libraries will become more complex and process sensitive. The introduction of DevOps style pipelines for macro development or comprehensive Open Source libraries further complicates the intricate balance between continuous improvement and development with that of maintaining stability for the duration of trial analysis, submissions, and simply reproducibility. The benefits of different approaches to macro library management are explored and how learnings from the R language can improve SAS macro library management and the sharing of entire macro suites.

Today's Topics

- Common terms
- Mechanism(s)
- Common Practice
- Continuous Improvement
- %library()
- Continuous Integration
- Continuous Delivery

Common *Confusing* Terms

■ DevOps

- Development and "IT" Operations
- Key Principles
 - ❑ Shared ownership
 - ❑ Rapid feedback
 - ❑ Workflow automation
- Combine development, *operations* and support for a SAS library

Organization

■ CI/CD

- Continuous Integration (CI)
- Continuous Delivery (CD)
- Key Principles
 - ❑ Continuous small cycles of develop, validate and release into production
 - ❑ Automated workflows
- Business processes and tools to rapidly develop, validate and release a SAS library

Business Process & Tools

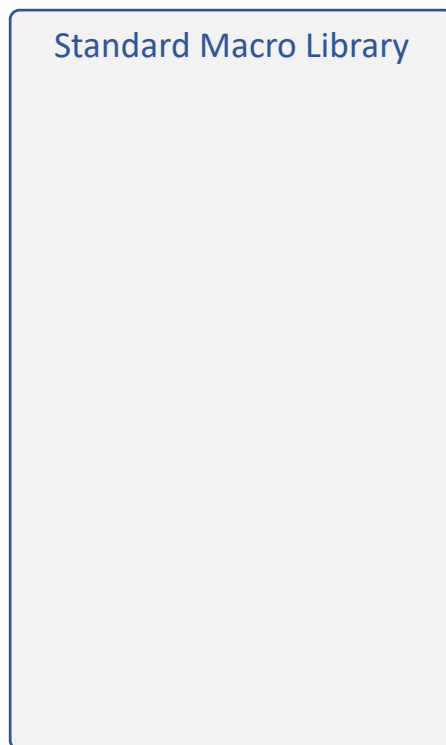
Mechanism(s)

```
options SASAUTOS = ( "/org/ta/project/study/report/macros" ,  
                    "/org/ta/project/study/macros" ,  
                    "/org/ta/project/macros" ,  
                    "/org/ta/macros" ,  
                    "/org/client/macros" ,  
                    "/org/standard/macros" ,  
                    ...  
                    )
```

- SAS Autocall Facility
- Equally applicable to SAS Macro Catalogs
- When calling a SAS macro for the first time in a session
 - SAS searches paths in sequence from first to last
 - First occurrence is used
- Overloading versus Masking
- Adherence to standards and compliance

Standard Library Common Practice

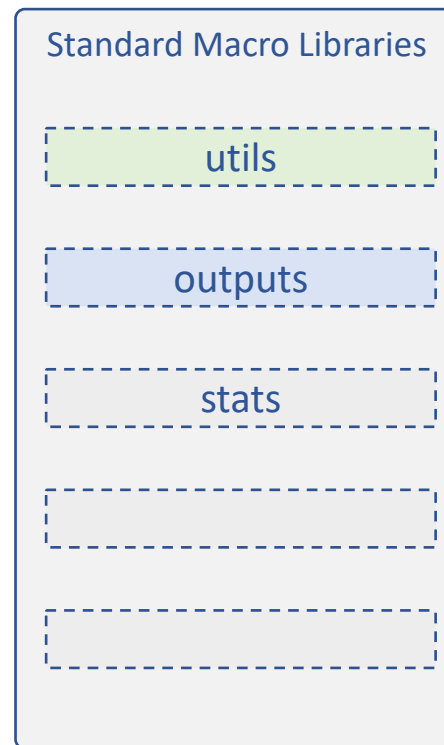
/org/**standard**/macros



 Time to develop and validate

 Schedule release

/org/standard/<**library**>/macros



Standard Macro Libraries

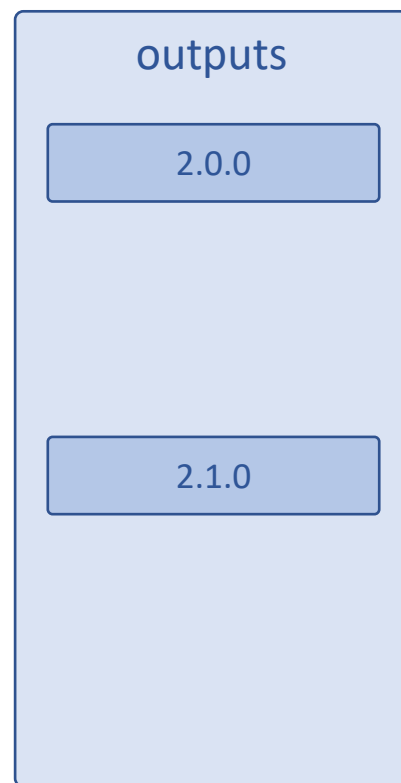
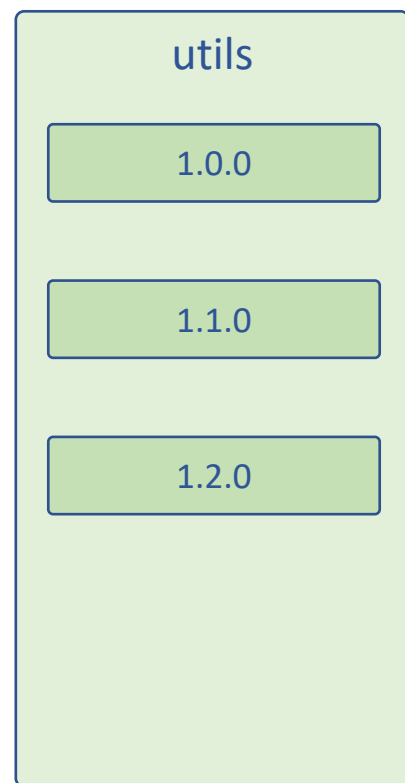
Development, maintenance and validation of a standard macro library is requires significant effort.

Customary for only a single central version in production at any given time which implies that any updates will impact all on-going business deliverables.

Smaller libraries were expected to require less effort and have less impact but it became evident that updates to one library usually required updates to other libraries negating any gains with smaller collections.

Library Versions

/org/standard/<library>/<version>/macros

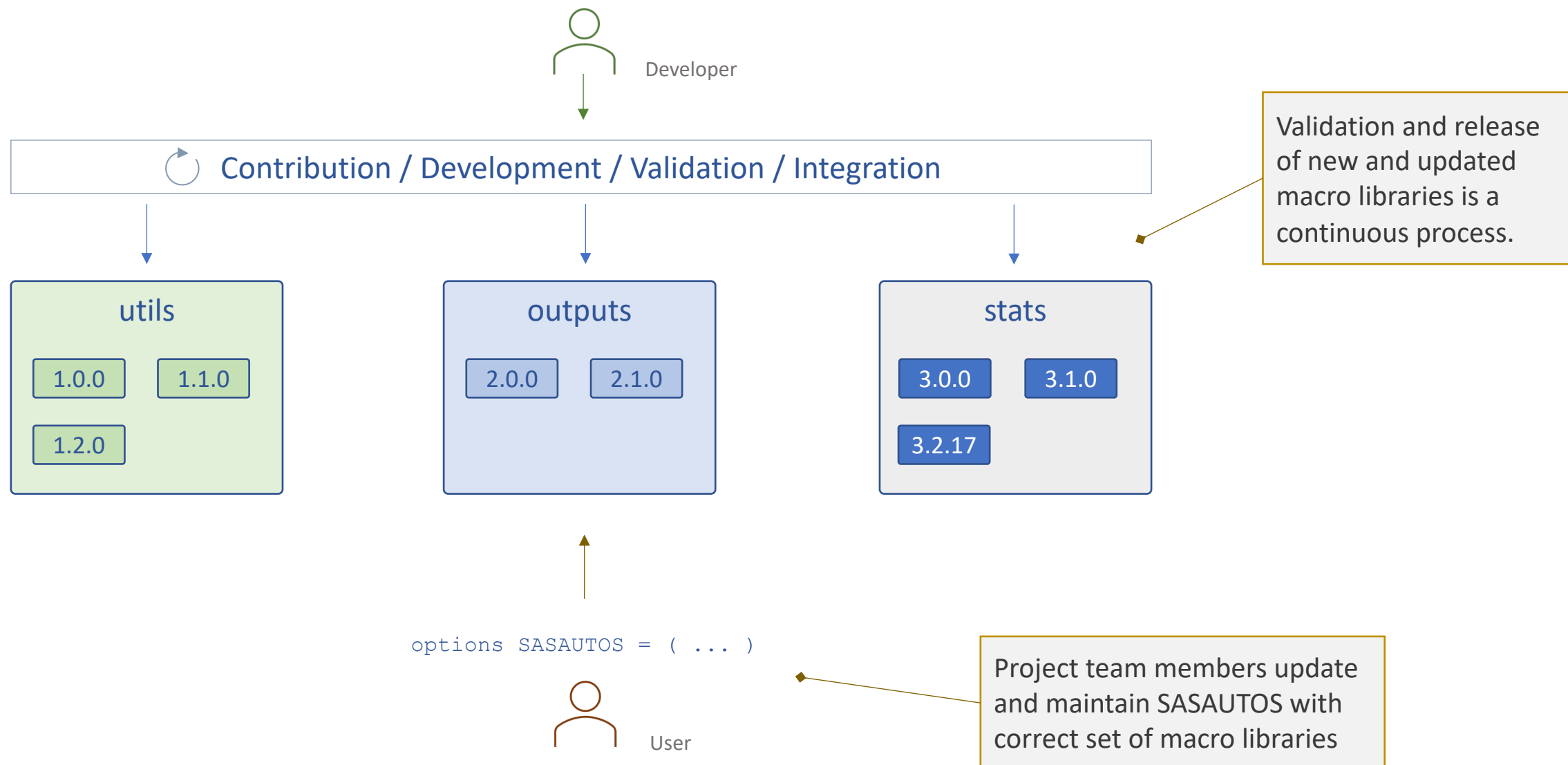


Reproducible
Previous versions
remain available

Avoid Disruption
Lock to a version for
DBL and final runs

Current Release
Ongoing projects
and studies use the
latest release

Continuous Improvement



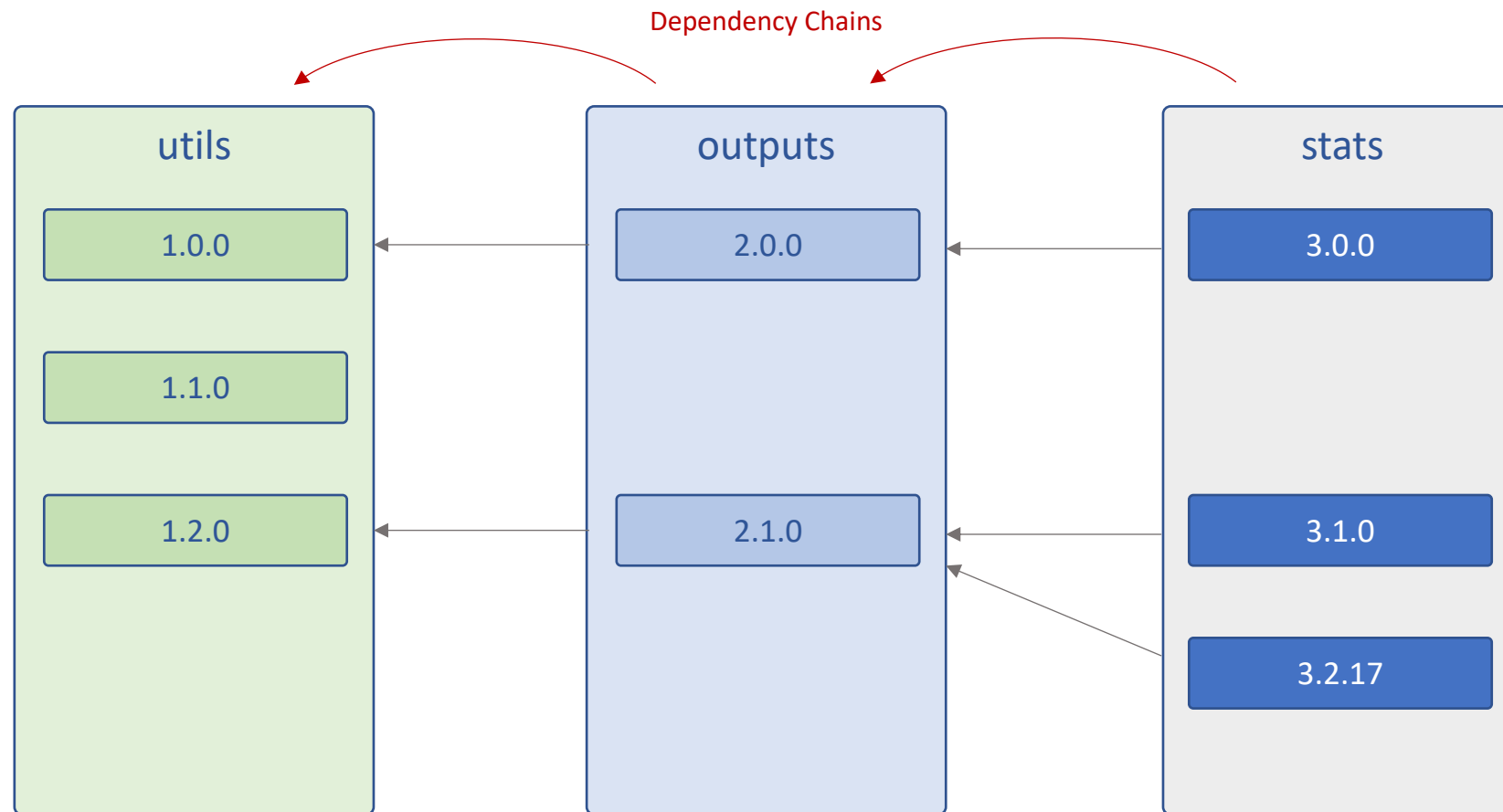
Getting Organized

No change in conventions

```
options SASAUTOS = ( "/org/ta/project/study/report/macros" ,  
                    "/org/ta/project/study/macros" ,  
                    "/org/ta/project/macros" ,  
                    "/org/ta/macros" ,  
                    "/org/client/macros" ,  
                    "/org/standard/libraries/stats/3.2.17/macros" ,  
                    "/org/standard/libraries/output/2.0.0/macros" ,  
                    "/org/standard/libraries/utils/1.0.0/macros" ,  
                    "/org/standard/macros" ,  
                    SASAUTOS  
                    )
```

Small adaptation to directory standards

Library Dependencies



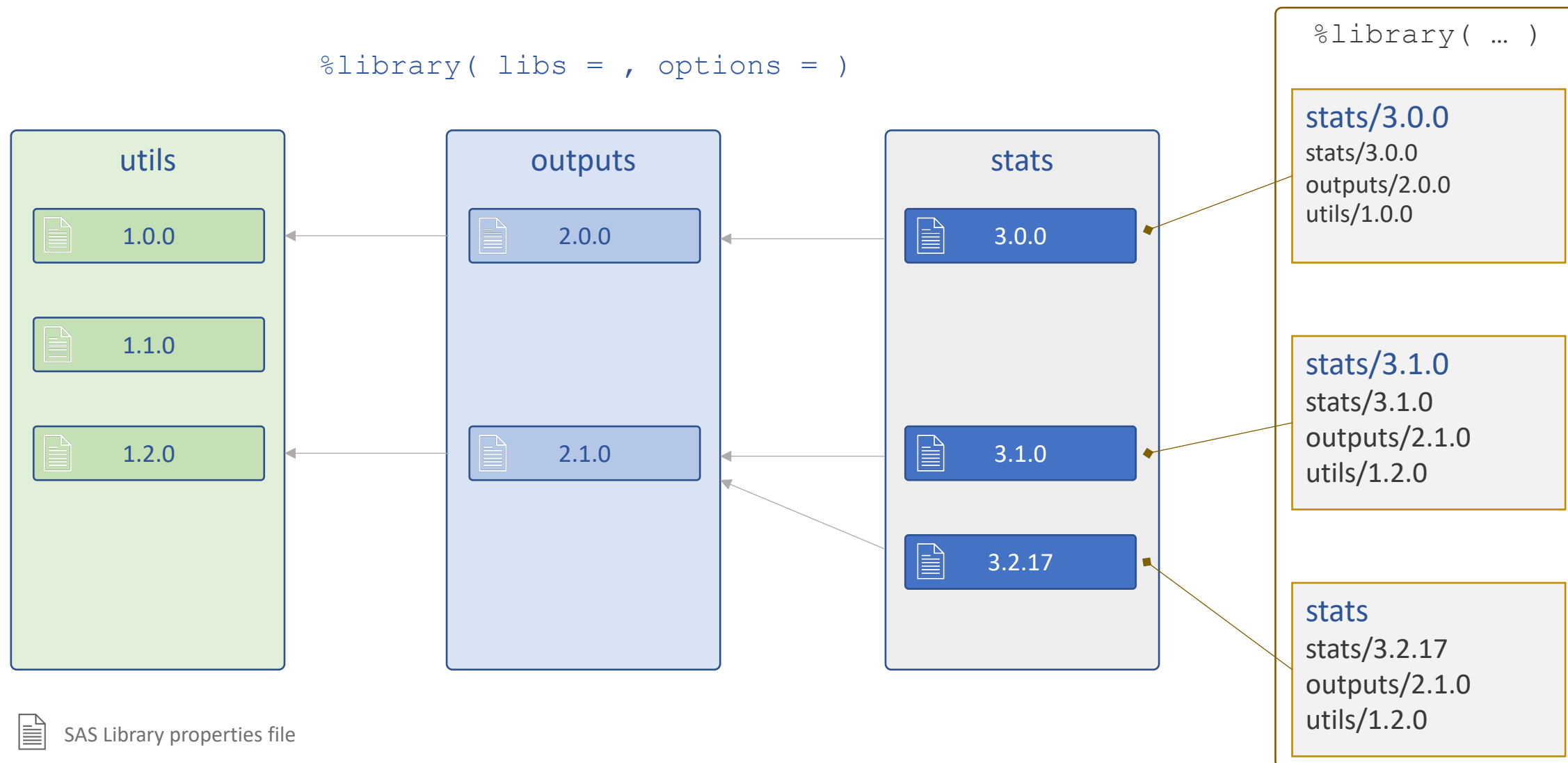
Validation

A SAS Library is validated based on its predefined set of dependencies.

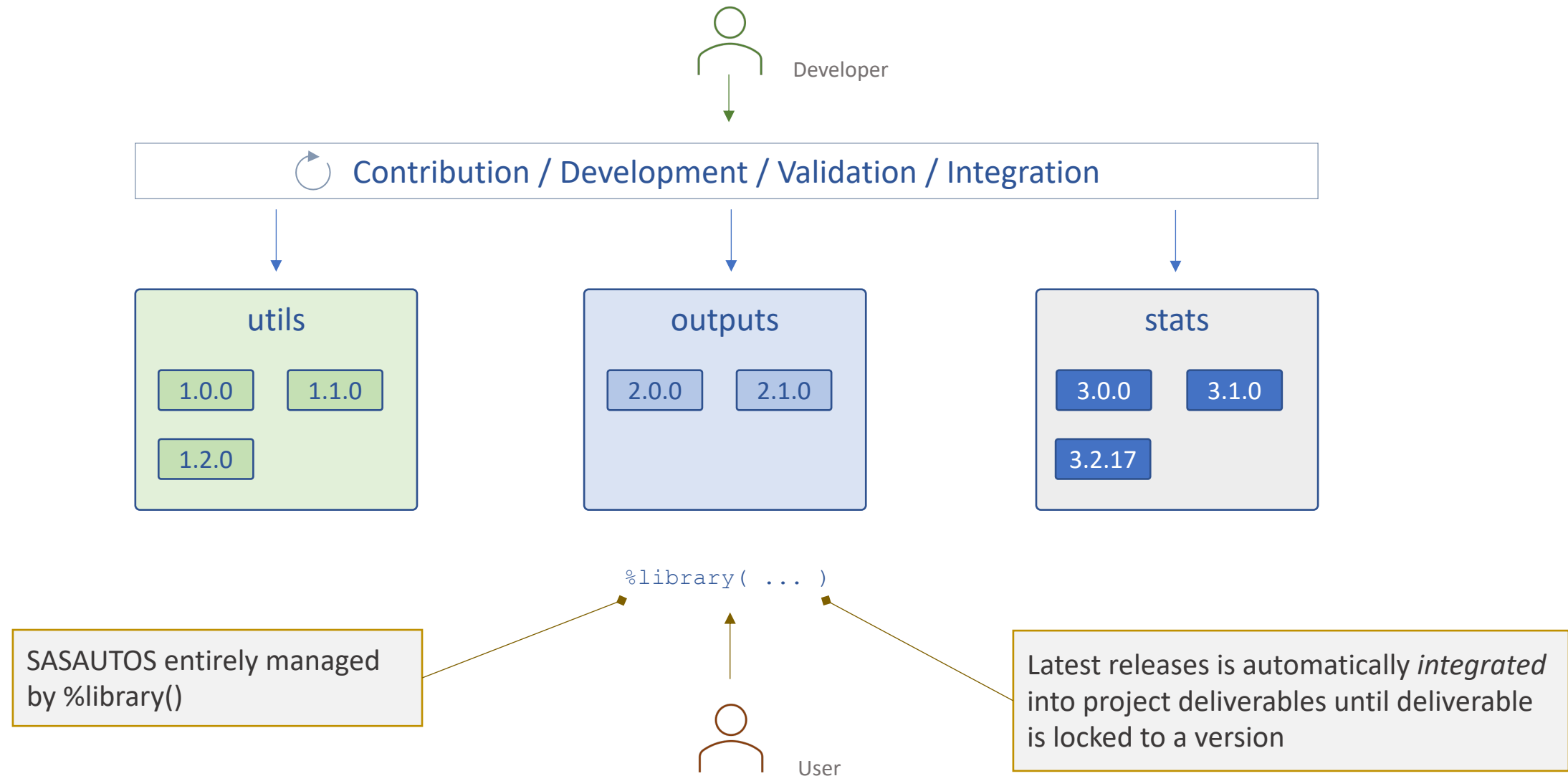
If a dependency is updated, the validation of the macro library needs to be re-validated to ensure that the dependency has not impacted the function of the macros in the library.

SAS Library Properties & %library()

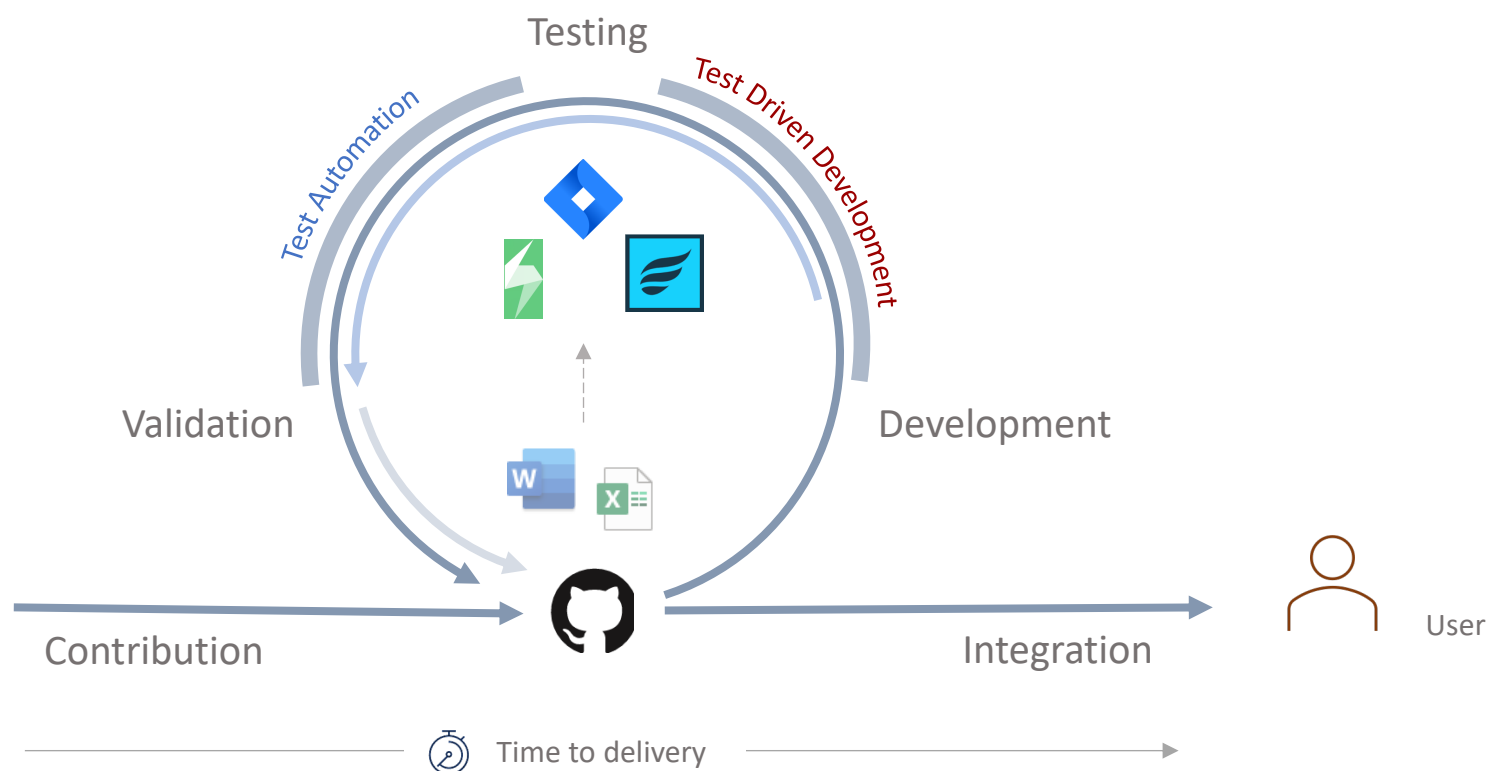
```
%library( libs = , options = )
```



Continuous Integration



Continuous Delivery



Contact Details

Magnus Mengelbier
magnus.mengelbier@limellogic.com

Limellogic AB
Jungmansgatan 12
SE-211 11 Malmö
Sweden

www.limellogic.com