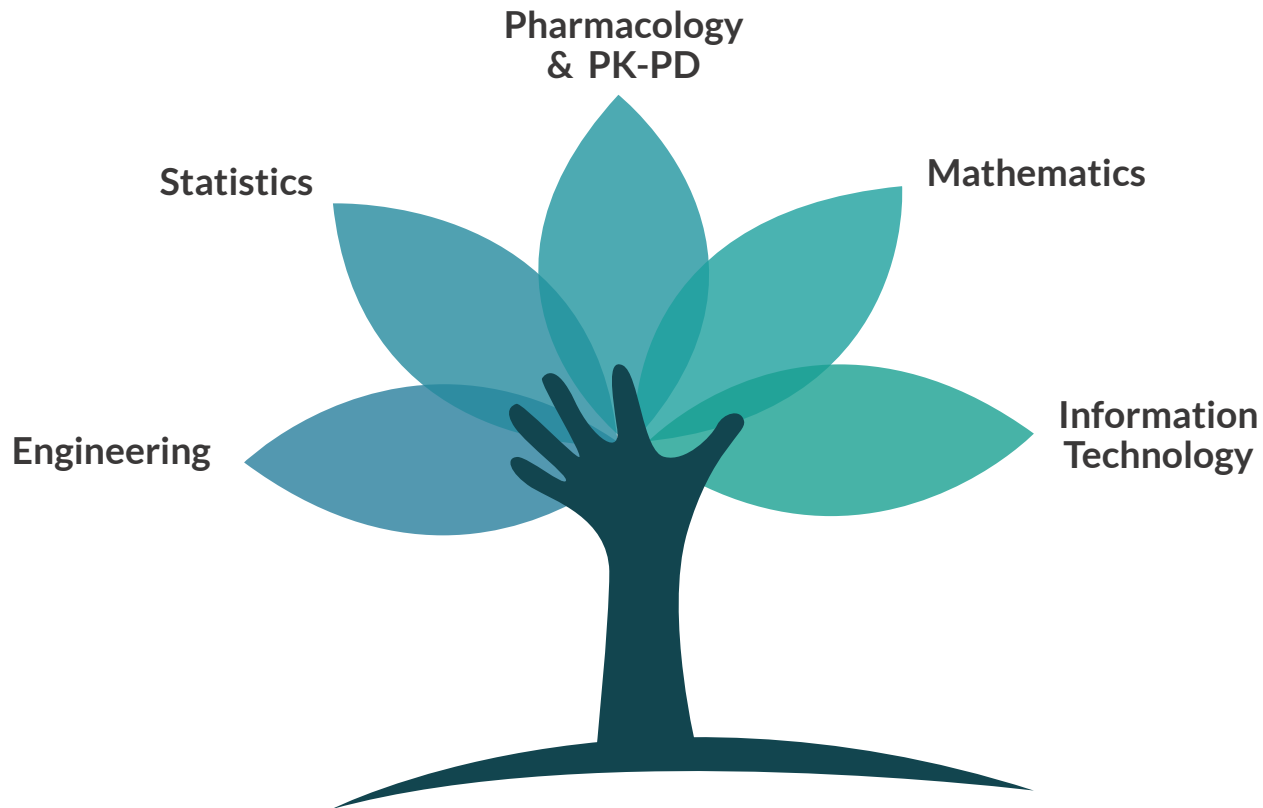# Solving the Package Management Puzzle

Devin Pastoor
Vice President, Technology Solutions
Metrum Research Group
devinp@metrumrg.com

What does Metrum do?

Pharmacology & PK-PD

Statistics

Mathematics

Engineering

Information Technology

DATA → KNOWLEDGE → ACTION

Strategizing and advocating for R is hard because we're trying to solve a much larger slice of problems with a single toolchain

Clearly see consistent principles

Reproducibility, collaboration, discoverability, efficiency, accuracy are all key elements that drive and validate decisions

It needs to work

And should keep working consistently

What do you do with R?

- Tables and Figures

- Regulatory Statistical analysis

- ~~Voodoo~~ AI

- Build applications that will run at longer time-scales (shiny apps/api's etc)

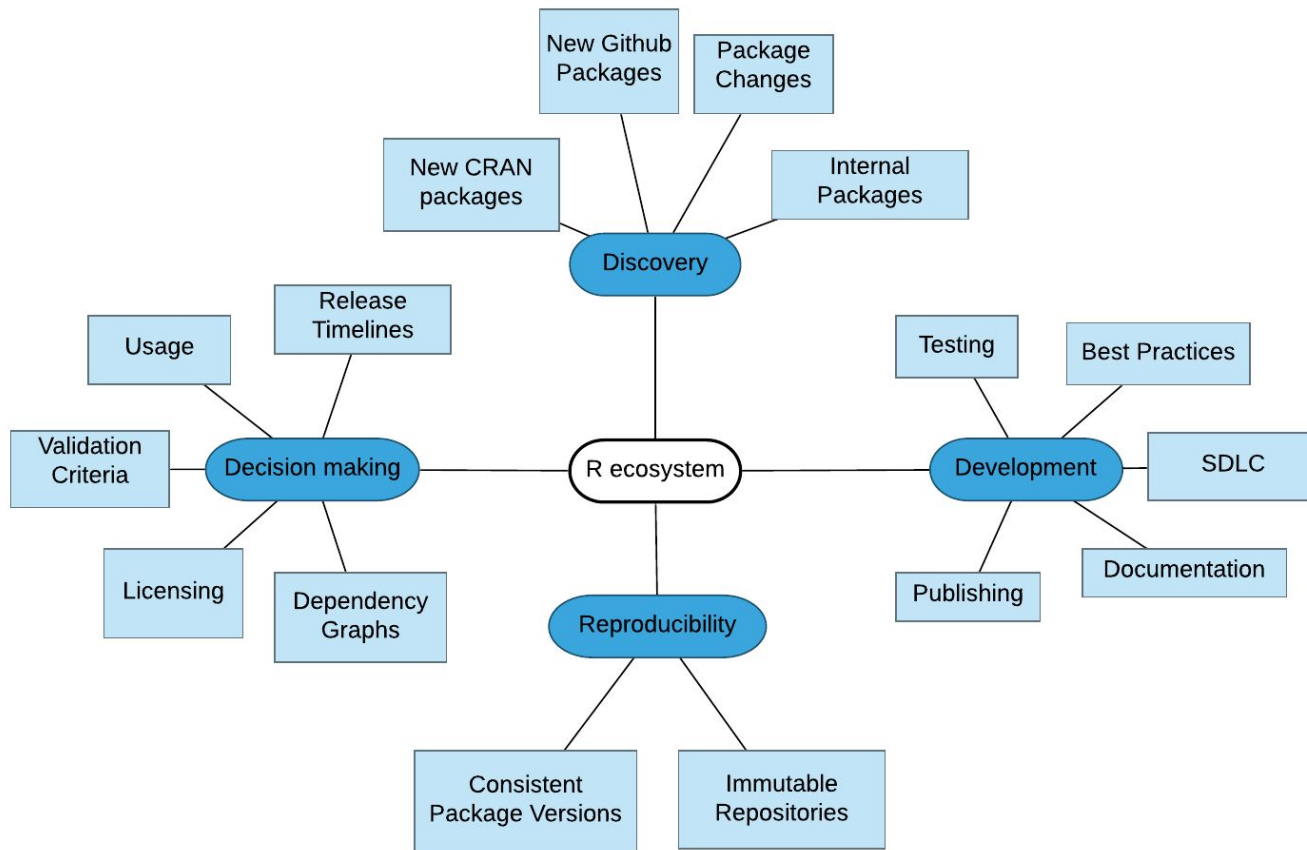# What does R look like in your organization

Where does package management fit in?

- **How to vet and chose what packages they're willing to use**
  - CRAN
  - Bioconductor
  - github
- **How to make packages available**
  - Point to CRAN directly
  - CRAN mirror (eg rstudio package manager)
  - Default Global installs vs project level
- **How and where (need to) install packages**
  - Windows/mac laptop (binaries)
  - Long-lived linux servers/HPC's
  - Docker containers
- **How often they need to install**

No one tool/product addresses these needs or will address these needs holistically

Many Decisions

- R ecosystem
  - Discovery
    - New Github Packages
    - Package Changes
    - New CRAN packages
    - Internal Packages
  - Decision making
    - Release Timelines
    - Usage
    - Validation Criteria
    - Licensing
    - Dependency Graphs
  - Development
    - Testing
    - Best Practices
    - SDLC
    - Documentation
    - Publishing
  - Reproducibility
    - Consistent Package Versions
    - Immutable Repositories

What are (generally) **unknown** risks groups are opening themselves up to?

lockfiles are great...until they're not

```
packrat
…
Package: hms
Source: CRAN
Version: 0.4.2
Hash: b4096a4f6a6736138e9a825c2baaacf0
Requires: pkgconfig, rlang

Package: htmltools
Source: CRAN
Version: 0.3.6
Hash: b24df7ea0856eab6618f6a56016d940d
Requires: Rcpp, digest

Package: htmlwidgets
Source: CRAN
Version: 1.2
Hash: de18b75f31630089b22e30d4b188cfbe
Requires: htmltools, jsonlite, yaml
…
```

Upgrading package versions in a project

Why lockfiles are not the (sole) solution for businesses

- Unclear how lockfile came to be constructed
- Too easy to fragment
- Unclear what packages drove the creation of lockfiles
- How to upgrade or add packages over time?
- Does not (alone) mean it will be achieveable to re-construct cross-platform

CRAN is great...until it's not

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It tests against many platforms and configurations!

`CRAN Package Check Results for Package` **dplyr**

Last updated on 2018-08-15 15:46:57 CEST.

Flavor	Version	$T_{install}$	T_{check}	T_{total}	Status	Flags
r-devel-linux-x86_64-debian-clang	0.7.6	316.61	124.08	440.69	OK	
r-devel-linux-x86_64-debian-gcc	0.7.6	307.18	96.59	403.77	OK	
r-devel-linux-x86_64-fedora-clang	0.7.6			640.96	NOTE	
r-devel-linux-x86_64-fedora-gcc	0.7.6			637.13	NOTE	
r-devel-windows-ix86+x86_64	0.7.6	588.00	217.00	805.00	NOTE	
r-patched-linux-x86_64	0.7.6	358.81	114.24	473.05	OK	
r-patched-solaris-x86	0.7.6			546.80	NOTE	
r-release-linux-x86_64	0.7.6	363.78	113.02	476.80	OK	
r-release-windows-ix86+x86_64	0.7.6	619.00	242.00	861.00	NOTE	
r-release-osx-x86_64	0.7.6				NOTE	
r-oldrel-windows-ix86+x86_64	0.7.6	819.00	286.00	1105.00	NOTE	
r-oldrel-osx-x86_64	0.7.6				NOTE	

⟲ BrodieG Retweeted

Michael Chirico
@michael_chirico

I mainly want to take this opportunity to flex for CRAN! 💪💪

The package is a port of a C++ Python module to use Rcpp.

I was originally booted from CRAN due to some memory leak issues which had gone unnoticed for years in 🐍! CRAN checks caught the issue immediately. #rstats

10:33 AM · Aug 21, 2019 · Twitter Web App

It contains the latest blessed code!

Jenny Bryan
@JennyBryan

Following

Replying to @GoldbergData

reprex.tidyverse.org but you should install from GitHub, the CRAN version is broken (and not authored by me, despite what DESCRIPTION says)

12:26 AM - 4 Jun 2018

2 Retweets **9** Likes

2   2   9

Hadley Wickham ✔ @hadleywickham · May 15

Replying to @P_Boueri @MichaelFrasco

We also have enough development resources we can rapidly roll out a fix if we need to. Currently CRAN release time is biggest risk: dplyr is broken on CRAN; dev version is ok and we submitted almost a month ago and it's still not up

💬   ⟳   ♡ 3   ✉

It builds binaries!

Joris Meys
@JorisMeys

Follow

. @krlmlr Just noticed there's a pretty serious conflict between #rstats pkg rlang 0.3.0 and tibble 2.0.0. It's related to the soft deprecation of new_list_along().

I've seen a 2.0.1 milestone for tibble on @github so I guess you're aware already. Any idea on the timeline?

7:19 AM - 12 Jan 2019

2 Retweet **2** Likes

2   ⟲ 2   ♡ 2

Tweet your reply

Kirill Müller @krlmlr · 6h
Replying to @JorisMeys @github

The update should appear on CRAN any time now. It's delayed by a package that accesses some API in its tests and led to a false positive with CRAN's automated checks.

♡ 1

lionel @_lionelhenry · 33m
Replying to @JorisMeys @krlmlr @github

the conflict is not serious, it's just a failing assumption in unit tests. However it does prevent the creation of CRAN binaries for tibble 2.0, which can cause updating issues...

cran.microsoft.com/snapshot/2018-10-20/

devtools: Tools to Make Developing R Packages Easier

Collection of package development tools.

Version:	2.0.0
Depends:	R (≥ 3.0.2)
Imports:	callr, cli, digest, git2r (≥ 0.23.0), httr (≥ 0.4), jsonlite, memoise (≥ 1.0.0), methods, pkgbuild (≥ 1.0.2), pkgload (≥ 1.0.1), rcmdcheck (≥ 1.3.0), remotes (≥ 2.0.0), rstudioapi (≥ 0.6.0.9000), sessioninfo, stats, tools, usethis (≥ 1.4.0), utils, withr
Suggests:	BiocInstaller, BiocManager, bitops, covr (≥ 3.2.0), crayon, curl (≥ 0.9), evaluate, foghorn (≥ 1.0.1), gmailr (> 0.7.0), knitr, lintr (≥ 0.2.1), mockery, pingr, MASS, pkgdown, Rcpp (≥ 0.10.0), rhub, rmarkdown, roxygen2 (≥ 6.1.0), rversions, spelling (≥ 1.1), testthat (≥ 1.0.2), whisker
Published:	2018-10-19
Author:	Hadley Wickham [aut], Jim Hester [aut, cre], Winston Chang [aut], RStudio [cph], R Core team [ctb] (Some namespace and vignette code extracted from base R)
Maintainer:	Jim Hester <james.hester at rstudio.com>
BugReports:	https://github.com/r-lib/devtools/issues
License:	GPL-2	GPL-3 [expanded from: GPL (≥ 2)]
URL:	https://github.com/r-lib/devtools
NeedsCompilation:	no
Materials:	README NEWS
CRAN checks:	devtools results

Downloads:

Reference manual:	devtools.pdf
Vignettes:	Devtools dependencies
Package source:	devtools_2.0.0.tar.gz
Windows binaries:	r-devel: devtools_1.13.6.zip, r-release: devtools_1.13.6.zip, r-oldrel: devtools_1.13.6.zip
OS X binaries:	r-release: devtools_1.13.6.tgz, r-oldrel: devtools_1.13.6.tgz
Old sources:	devtools archive

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Published:	2019-04-08
Author:	Hadley Wickham [aut], Jim Hester [aut, cre], Winston Chang [aut], RStudio [cph], R Core tea
Maintainer:	Jim Hester <james.hester at rstudio.com>
BugReports:	https://github.com/r-lib/devtools/issues
License:	GPL-2	GPL-3 [expanded from: GPL (≥ 2)]
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`Downloads:`

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NeedsCompilation: no	
Materials:	README NEWS
CRAN checks:	devtools results

`Downloads:`

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OS X binaries:	r-release: devtools_2.0.2.tgz, r-oldrel: devtools_1.13.6.tgz
Old sources:	devtools archive

`Reverse dependencies:`

Version: 2.0.1
Check: tests
Result: ERROR
 Running 'test-that.R' [191s/202s]
 Running the tests in 'tests/test-that.R' failed.
 Last 13 lines of output:
  Loading required package: devtools
  <simpleError: pandoc version 1.12.3 or higher is required and was not found (see the help page ?rmarkdown::pandoc_available).>
  —— 1. Error: Package readme can be built (@test-build-readme.R#8) ————————————

pandoc version 1.12.3 or higher is required and was not found (see the help page ?rmarkdown::pandoc_available).

  1: build_readme("testReadme") at testthat/test-build-readme.R:8
  2: callr::r(build, args = list(pkg_path = pkg$path, readme_path = readme_path, ... = ...,
  quiet = quiet), show = TRUE, spinner = FALSE)
  3: get_result(output = out, options)

  ══ testthat results ═══
  OK: 42 SKIPPED: 11 FAILED: 1
  1. Error: Package readme can be built (@test-build-readme.R#8)

  Error: testthat unit tests failed
  Execution halted
Flavor: r-release-osx-x86_64

Why CRAN is not the (sole) solution for businesses

- Moving target
- Platform inconsistencies
  - Binary vs src
  - non-CRAN platform
- CRAN philosophies not necessarily aligned with enterprise business
  - "We need it to work everywhere"
  - What is secure/unsecure
  - If you're on CRAN we don't want you to break...but good luck otherwise
- CRAN submission acceptance and timelines can be opaque
- Even professional developers are still people - everyone makes mistakes

THIS IS FINE.

Think about **First Principles**

the fundamental concepts or assumptions on which a theory, system, or method is based.

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Package repositories should be treated immutably

Package installation requirements should be declarative and customizable

Changes to any system should be clearly conveyed to the user before action takes place

Individual tools should be modular and extensible

🔒 GitHub, Inc. [US] | github.com/metrumresearchgroup/pkgr

Pull requests   Issues   Trending   Explore

📖 metrumresearchgroup / pkgr

👁 Unwatch ▾   ⭐ Star   18   🍴 Fork

<> Code   ⓘ Issues 40   ⑪ Pull requests 8   ▶ Actions   ⊞ Projects 2   📖 Wiki   🏷 Releases 24   More ▾   ⚙ Settings

No description, website, or topics provided.

Edit

Manage topics

| 🕐 **495** commits	⑂ **11** branches	🏷 **24** releases	👥 **4** contributors

Branch: master ▾   🏷 v0.5.0-beta.3

Create new file   Find File   Clone or download ▾

👤 **dpastoor** doc: update readme with newer installer   Latest commit b0b0e7f 19 hours ago ▾

📁 cmd	release: v0.4.0	3 months ago
📁 configlib	test: test for yml3.Format(), which is Marshall/Unmarshal, by Viper-I...	3 months ago
📁 cran	test: adding unit tests for isRVersionCompatible	4 months ago
📁 desc	test: adding unit tests for isRVersionCompatible	4 months ago
📁 docs/images	doc: adding windows installation instructions.	22 days ago
📁 gpsr	add: separate logging statements for set repositories depending on if...	4 months ago
📁 integration_tests	Test/integration test guides (#83)	3 months ago
📁 logger	chore: cleaning up remaining logrus identifier.	5 months ago

How do you start the conversation of what works for you and your organization?

Many Decisions
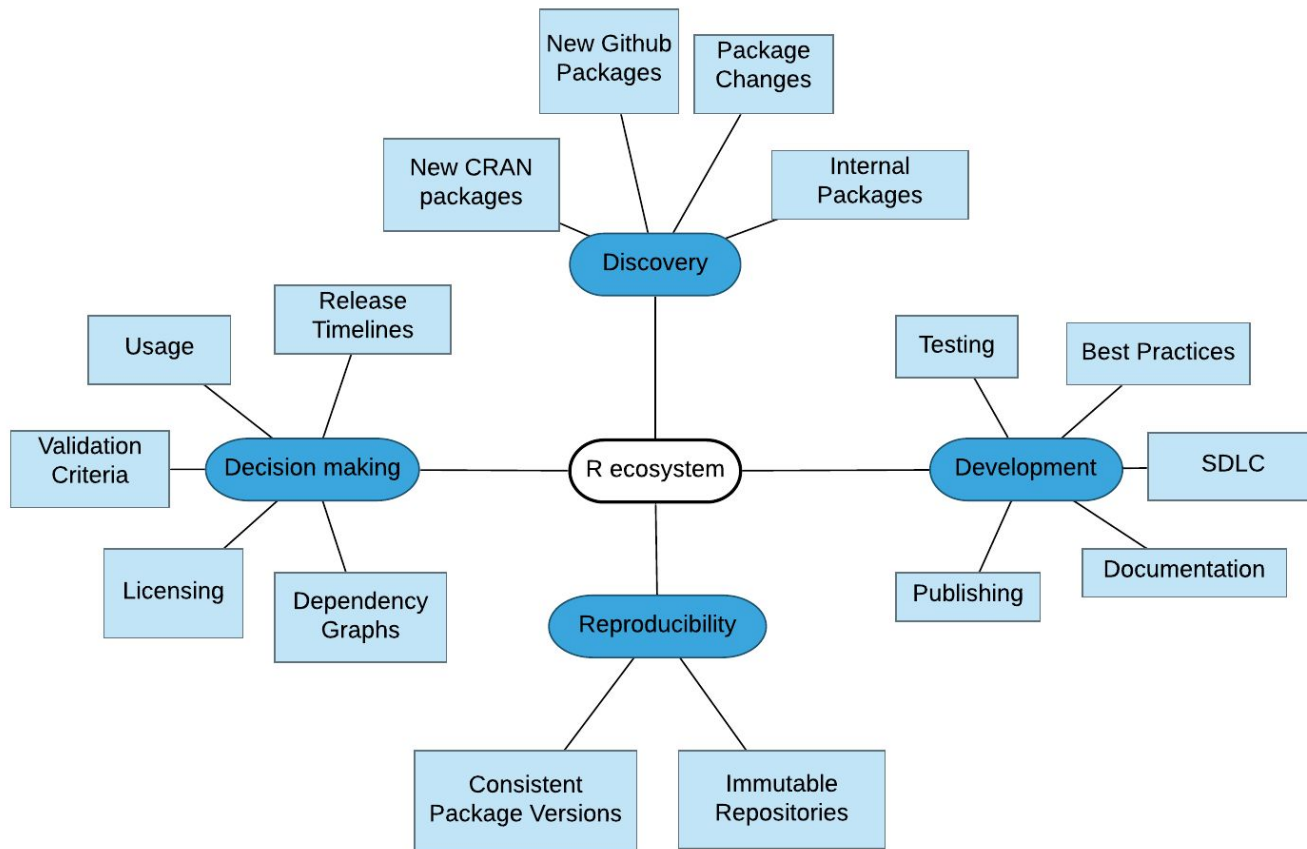
Identify the the risks/gaps that matter to you

If you want others to join - get your approach and code in the "open" **early**.

Communication is Key

When possible, stand on the shoulders of others

But remember **first principles**

Come talk to me

Find me at devinp@metrumrg.com
and
@devinpastoor (I don't tweet much)

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