November 7, 2014

# Welcome

## Summary

- Cytoscape v3.2 is now available for immediate download.
- Major new features
  - Ability to show nodes as dynamic charts
  - RESTful interface enables "Cytoscape as a Service"
  - Faster startup, session load, and graph merge
  - Higher capacity for large graphs (both memory and draw speed)
  - Tentative support for Java 8
  - Export graph as a fully packaged web site ready for a web server
- Addresses 95 issues relative to v3.1.1 (see Section 10)
  - Various bugs and inconsistencies in the new Style pane
  - Minor issues in importing/exporting table data and PSIMI v2.5 XML files
  - Bugs in starting command scripts (via the Cytoscape command line)
  - Better user and App Developer documentation
  - Feature improvements for exporting networks to web pages
- 18 more Apps are available in the App Store as compared to the v3.1.1 release.
- Ready for use by all segments of the Cytoscape community.
- Continues v3.1.1's core feature set, specifically:
  - Upward compatible and can coexist with previous Cytoscape versions
  - Most popular plugins from previous versions are available, with more to follow.
- What to do next …

Release notes: http://www.cytoscape.org/releasenotes.html

## Dear Cytoscape User

We are proud and pleased to release Cytoscape v3.2. This new release contains both new features and improvements to functionality and documentation as described in Sections 7 and 10.

This release marks our most extensive testing efforts to date, including 51 different combinations of operating systems and Java Virtual Machines across Windows, Linux, and Mac OS platforms. Check out your system's configuration here: http://tinyurl.com/k5nppxo. Note that v3.2 retains support for 32 bit JVMs and Windows XP, as they are a significant portion of Cytoscape installations. Note, too, that v3.2 introduces experimental support for Java 8.

We're also pleased to report that in the last few months, Cytoscape downloads have averaged about 12,000 per month, with a peak of 15,000 in March. During each working day, Cytoscape is started over 2,000 times worldwide!

Finally, in v3.2, 18 Apps were added to the App Store (http://apps.cytoscape.org), bringing the total to 71. (So far in 2014, 39 apps have been added for v3.x, while only one plugin has been added for v2.x.) The apps new for v3.2 include:

| | | | |
|---|---|---|---|
| ARACNE | CyToStruct | PanGIA | structureViz2 |
| cddApp | EnrichmentMap | PetriScape | Synapse Client |
| cyLineUp | ENViz | PINBPA | WordCloud |
| CyNetworkBMA | iRegulon | Propagate | |
| cyREST | JGF App | RINalyzer | |

We expect to make a v3.2.1 maintenance release in mid Q1 2015, followed by a v3.3 feature release a few months later. As our plans firm up, we'll publish them to the Cytoscape community. For more on our roadmap, see Section 9.

> If you are a _new_ or _casual_ Cytoscape user, **welcome aboard!** Feel free to either read on or jump ahead to What to Do Next for a quick start.
>
> For clarity, references to "Cytoscape 3.x" apply to all Cytoscape versions 3.0.0 and later.

## For Cytoscape v2.x Users

Previous Cytoscape releases (through v2.8.3) focused on adding numerous annotation, import, layout, analysis, and visualization features, all of which have combined to deliver critical insights into biological processes of interest to Cytoscape's broad and loyal user community. In fact, many of these features were created and contributed by Cytoscape users, themselves, using Cytoscape's plugin architecture.

Version 3.0 marked a major reorganization of Cytoscape program code – it enabled us to deliver additional features more quickly and reliably than before, including improvements that benefit new users, casual users, power users, and app developers. Along the way, some features were changed to allow them to better interoperate with other features, some little-used features were dropped, and user interface was improved. We were particularly excited about the new Cytoscape App Store (described below), which afforded users access to the growing collection of _apps_ (formerly called _plugins_) produced by fellow Cytoscape users. A table of new features is presented in Section 7.

Since v3.0, we released updates v3.0.1 and v3.0.2 as maintenance releases, and then v3.1 and v3.2 as feature releases, including greatly improved visual styles, node filtering, speed, network capacity, and web publishing.

While all version 3 releases are upwardly compatible with previous Cytoscape versions (i.e., they can load, analyze, and display networks and attributes stored using previous versions, including v2.x), they can coexist with previous versions on the same workstation. It is not necessary to uninstall previous versions before installing a version 3 release, and you can choose to use both on the same workstation.

Version 3 is rapidly maturing and has achieved a reputation for speed, reliability, and support that makes it a _superior choice_ (compared to v2.x) for most uses. If you are using v2.x, now may be a good time to switch to v3.x and enjoy the new Apps available in the App Store (http://apps.cytoscape.org).

A table describing Cytoscape support is presented in Section 8.

We are very excited to make this release, and hope you find it an indispensable tool in your research. To get you started, we have provided additional introductory material to get you started on the right foot, and we have also provided background material for general interest.

Please let us know how we're doing and how we can better advance your research!

The Cytoscape Team

## What to Do Next

We hope to help you use Cytoscape in the most productive way. Your next steps depend on how experienced you are with Cytoscape and what you would like to do. In the table below, please find the category that best describes you, and proceed accordingly.

| Type of Cytoscape User | Where to Read Next |
|---|---|
| **New** | **For New Users** (Section 1) |
| **Casual** | **For Casual Users** (Section 2) |
| **Power** | **For Power Users** (Section 3) |
| **App Developers** | **For App Developers** (Section 4) |
| **General Interest** | Try getting oriented by reading:<br>    **General Background** (Section 5)<br>    **Cytoscape App Store** (Section 6)<br>Then try browsing:<br>    **New Features** (Section 7)<br>    **Support Offering** (Section 8)<br>    **Future Plans** (Section 9)<br>To get your feet wet, try:<br>    **For New Users** (Section 1) |

# 1. For New Cytoscape Users

### What is Cytoscape?

Cytoscape is software that can help you visualize complex networks (as *graphs*) representing relationships between genes, proteins, or other entities. Cytoscape tracks and displays these entities (as graph *nodes*) and relationships between them (as graph *edges*). Cytoscape, per se, does not assign meaning to either nodes or edges – you can assign your own meanings to them, and you can add your own node or edge attributes (e.g., name, measurements, states, etc.) that customize your graph to represent semantics important to you. While Cytoscape provides simple analytics and visualizations, others are available as apps from the Cytoscape App store (see Section 6).

### What Do I Need Before I Can Use Cytoscape?

At the very least, you must provide Cytoscape with a list of nodes. You can also provide a list of edges and attributes. You can enter your graph manually or import it from your own files – Cytoscape supports a wide variety of file formats, including text and Excel. Cytoscape can also load pre-configured networks (e.g., from BioGRID) so you can leverage them without having to enter them yourself.

### Can Cytoscape Help Me Get Started?

Yes! The Cytoscape team had provided many resources tailored for all kinds of users (see Section 8). To start, there is an Installation Guide and numerous tutorials. Once you load your graph, you may find additional useful analytics and visualizations at the App Store (see Section 6).

### Which Cytoscape Version Should I Use?

Generally, you should use v3.1.1 (the newest version). v2.x has been in the field for several years and will be supported into the future, but over time, v3.x and successors will be better supported.

*Note that if you have already installed v3.0.0, v3.0.1, v3.0.2, or 3.1, you can install v3.1.1 without uninstalling your previous version.*

### How to Download and Install v3.x

- Surf to http://www.cytoscape.org, click on the Download Cytoscape button, and follow the prompts
- ***Be sure to consult with the Release Notes (viewable via the Release Notes button) for issues and solutions pertaining to your installation***
- Surf to http://www.cytoscape.org, click on the Release Notes button, click on a User Manual link, and follow the instructions in the *Launching Cytoscape* section.

# 2. For Casual Cytoscape Users

*If you're confident of your Cytoscape skills, please read the Power Users information (Section 3).*

*If you're Cytoscape skills are rusty, please continue with the New Users information (Section 1).*

# 3. For Cytoscape Power Users

### Is v3.x for Me?

The answer is most likely yes! Most modern v2.x plugins have been converted to v3.x apps, and new v3.x apps are arriving in Cytoscape's App Store far more quickly than v2.x plugins (-- *app* is the v3.x name for the installable features known as a *plugin* in v2.x). To take stock, you can browse the App Store directly (Section 6). Note that some v2.x plugins have been incorporated directly into Cytoscape and need not be downloaded or installed. Consult the App Store to see a list of these apps.

*Note that v2.x plugins are not compatible with v3.x apps, and vice versa. If you rely on v2.x plugins that are not yet available for v3.x, you may need to remain with v2.x instead of upgrading to v3.x. Note, also, that the Cytoscape community is converting v2.x plugins to v3.x apps -- you might occasionally revisit the App Store to see if an app you need becomes available.*

### What's New in v3.x?

As described in the Welcome letter (above), v3.x incorporates a number of new features (Section 7) and productivity enhancing support offerings (Section 8), including the Cytoscape App Store (Section 6). The General Background section (Section 5) describes the rationale, advantages, and issues with v3.x.

### Will Support for v2.x Continue?

Cytoscape v2.x will be supported by the Cytoscape community for now, but with fewer upgrades and support options over time.

### Can I use v2.x and v3.x at the Same Time?

You can experiment with v3.x by installing it on your workstation – you can use both v2.x and v3.x on the same workstation.

### How to Prepare for v3.x

1. If you have already installed a v3.2 beta version, *please uninstall it before proceeding.* The Cytoscape v3.0 and v3.1 versions can coexist with v3.2, and do not need to be uninstalled.
2. Consult the App Store (Section 6) to verify that the apps you need are available. Some apps have become part of the Cytoscape core, and you won't need to download them. Other apps are available in the Cytoscape App store.
3. Browse the New Features table (Section 7) to see what we have added since v2.x.
4. Browse the Future Plans table (Section 9) and Support Offering table (Section 8) to see where the Cytoscape community is going.

### How to Download and Install v3.x

- Surf to http://www.cytoscape.org, click on the Download Cytoscape button, and follow the prompts
- ***Be sure to consult with the Release Notes (viewable via the Release Notes button) for issues and solutions pertaining to your installation***
- Surf to http://www.cytoscape.org, click on the Release Notes button, click on a User Manual link, and follow the instructions in the *Launching Cytoscape* section.

# 4. For Cytoscape App Developers

Cytoscape manages graph storage and display, and contains a number of common analytic and visualization functions. App Developers may write *apps* (formerly known as *plugins*) to perform problem-specific analytics, graph layouts, or other visualizations.

Before starting app development, you should be familiar with overall Cytoscape usage and functionality – see the Power Users section (Section 3) to start working with v3.x if you have not already done so.

Note that v2.x plugins do not work with v3.x. In order get the benefits of improved stability, the Cytoscape team found it necessary to change the relationship between plugins/apps and the Cytoscape core. Many plugins have been ported to v3.x (see Section 6). The porting exercise is substantial, and once a plugin is converted to an app, it will continue to work at least until v4.0 is released – there is no v4.0 planned at this time. For more on this topic, see:

http://wiki.cytoscape.org/Cytoscape_3/CoreDevelopment/Motivation

## Should I Convert My v2.x Plugin to a v3.x App?

Yes! Cytoscape v2.x will be supported by the Cytoscape community for now, but with fewer upgrades and support options over time.

## How Do I Get Started With App Development?

To get started with app development:

http://wiki.cytoscape.org/Cytoscape_3/AppDeveloper

To convert a v2.x plugin to a v3.x app, refer to:

http://wiki.cytoscape.org/Cytoscape_3/AppDeveloper/PluginPortingGuide
or
http://f1000research.com/articles/3-150/v1

For a broader view of the Cytoscape system (including the Core), refer to:

http://wiki.cytoscape.org/Cytoscape_3/CoreDevelopment

## Are there App Samples?

Yes! See:

http://opentutorials.cgl.ucsf.edu/index.php/Tutorial:Creating_a_Simple_Cytoscape_3_App

Also note the App Cookbook:

http://wiki.cytoscape.org/Cytoscape_3/AppDeveloper/Cytoscape_3_App_Cookbook

# 5. General Background

The overall mission of Cytoscape is to be a freely available worldwide asset supporting network analysis and visualization for systems biology science.

The major focus of v3.x is the modularization and rationalization of code to solve stability issues in v2.x encountered as multiple developers pursued multiple agendas. Under v2.x, internal programmatic interfaces evolved from one release to the next, leading to the failure of working plugins over time and negative interactions between otherwise working plugins. Ultimately, this resulted in loss of programmer and user productivity, and undermined community confidence in Cytoscape.

v3.x addresses these issues by adopting modular coding practices promoted by the OSGi architectural framework[1]. This enables both the Cytoscape core and externally developed apps (formerly called *plugins*) to evolve independently without compromising unrelated functionality. At the logical level, Cytoscape leverages OSGi precepts to produce v3.x APIs having cleaner and clearer demarcations between functional areas. At the deployment level, OSGi enables on-the-fly substitution of one processing element for another (e.g., apps) in order to tailor Cytoscape to meet user requirements at runtime without reinstalling or reconfiguring Cytoscape.

Creating v3.x occupied an international team of engineers for over a year, and represents a strong investment toward reducing future development and support costs, and increasing reliability and evolvability. With the completion of v3.x, we expect to leverage v3.x as a platform to satisfy the evolving needs of multiple stakeholder groups, and as a platform enabling research on leading edge analysis and visualization techniques. v3.x is the intended successor to v2.x, with development and support of v2.x expected to diminish and disappear over time in favor of v3.x.

We believe that users will benefit most directly from the v3.x by:

- experiencing fewer core and app bugs from one release to the next
- the availability of more and richer apps (due to developers spending less time tracking and fixing bugs)
- more core features with higher biological and logistical value (due to improved flexibility provided by interface-driven development)

During the creation of v3.x, a number of features were added, as listed in the New Feature Table below.

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[1] www.osgi.org – also used as the basic framework for Eclipse and numerous commercial products

# 6. The Cytoscape App Store

The Cytoscape App Store is new in v3.x and targets broad demographics through specific features:

| Cytoscape User | Benefit |
|---|---|
| **New or Casual** | Find Cytoscape functionality easier via familiar paradigms of search and tag navigation |
| **Power or Frequent** | Find and install apps easier and provide crowdsourced rating and reviews |
| **App Developers** | Have a dedicated presence for their work, including a direct line to their users and critical statistics to justify their development on the Cytoscape platform. |

Furthermore, the App Store supports contests and social incentives that encourage critical technical and community development, including porting, analytics, rating/reviewing, and so on.

Note that the App Store supports only Cytoscape v3.x and does not contain plugins compatible with earlier Cytoscape versions. Likewise, plugins that work with earlier versions are not compatible with v3.x – the App Store (http://apps.cytoscape.org) contains a list of apps available for v3.x.

To access the App Store from Cytoscape, access Cytoscape's new Apps menu and choose the App Manager menu item.

# 7. New Feature Table

| Feature | Beneficiary | Manual Section |
|---|---|---|
| R/Matlab/Python REST integration | Power users | http://apps.cytoscape.org/apps/cyrest |
| Fast network loads | All users | |
| Publish layouts to web | All users | 23. Publish Your Data |
| Create entire web sites | Power users | 23. Publish Your Data |
| Fast network merge | All users | |
| Java 8 support (experimental) | All users | 3. Launching Cytoscape |
| Fast startup times | All users | |
| Nodes displayed as charts | Power users | 14.5.6. Creating Node Charts |
| Load larger networks | Power users | 3. Launching Cytoscape |

# 8. Support Offering Table

| Feature | Purpose | Beneficiary | URL |
|---|---|---|---|
| Cytoscape Google Groups<br>    Helpdesk<br>    Discuss | Community response on best effort basis | All users | mailto:cytoscape-helpdesk@googlegroups.com<br>mailto:cytoscape-discuss@googlegroups.com |
| User Manual | Comprehensive manual | All users | http://wiki.cytoscape.org/Cytoscape_3/UserManual |
| Installation Guide | Cytoscape installation | New/Casual users | Section 3 of http://wiki.cytoscape.org/Cytoscape_3/UserManual |
| Tutorials | Streamlined productivity | All users | http://opentutorials.cgl.ucsf.edu/index.php/Portal:Cytoscape3 |
| Presentation Slides on Web Site | Enable casual learning | All users | https://speakerdeck.com/cytoscape |
| Code Snippets | Commonly used App development code | App Developers | http://wiki.cytoscape.org/Cytoscape_3/AppDeveloper/Cytoscape_3_App_Cookbook |

# 9. Future Plans Table

| Feature | Purpose | Beneficiary | Timeframe |
|---|---|---|---|
| **R/Mathlab/Python integration** | Enable model access, analysis, and visualization from popular tools | Power users | Spring 2015 – **Python available NOW** |
| **Large network handling** | Improved layout, interactive, and load performance | Power users | Spring 2015 – **partially available now** |
| **Movies** | Clear and interactive engagement | New/Casual users | TBD |
| **Additional Visualizations** | | | TBD |
| **Additional Analytics** | | | TBD |
| **Wallpaper Collection** | Publicize good results associated with Cytoscape | All users, potential users, general public | TBD |
| **Case Studies** | Streamlined productivity | New/Casual Users | TBD |
| **Cytoscape Clinics**<br>**New/Casual User**<br>**Power User**<br>**App Developer** | Chat rooms give instant response based on community availability | All users | TBD |

# 10. Issues Addressed

The following issues were addressed in v3.2. Details for each issue can be found at Cytoscape's RedMine issue repository:

http://code.cytoscape.org/redmine

| Issue | Description |
|-------|-------------|
| 1648 | Improve interactive reponse for large networks (and other cool features...) |
| 1788 | Race condition sometimes causes apps to initialize before core bundles |
| 1887 | Remove unused image files in swing-application-impl |
| 2143 | Need to support unattended install |
| 2192 | Increase Startup Speed of Cytoscape 3 |
| 2196 | Destroying single view after creating multiple CyNetworkView causes collection title to be red |
| 2243 | Table Browser does not display third-party network tables |
| 2258 | Create a Grunt Project to display exported Cytoscape.js JSON files |
| 2373 | No way to permanently import style |
| 2374 | Network View's style not updated after deleting a mapped column |
| 2410 | Table export/merge greyed out until table selector clicked |
| 2415 | Need a function to export session as HTML5 |
| 2426 | Add "required" flag to Tunable annotations |
| 2434 | PSI-MI file writer creates invalid PSIMI 2.5 XML file |
| 2440 | Execution Icon in Launcher is Java rather than Cytoscape in Ubuntu |
| 2493 | Merge networks needs to provide better progress |
| 2499 | Cut option doesn't immediately remove node/edge |
| 2505 | Style options should be ordered |
| 2517 | Creating an OSGi Bundle tutorial needs to be updated. |
| 2524 | Add support for importing attribute files without .attrs extension |
| 2525 | Problems with annotations impl |
| 2530 | Rendering Engine ID of network views not saved in the session file |
| 2532 | Install From File shows duplicate app entries in App Manager Currently Installed |
| 2538 | Merging large networks needs better user feedback |
| 2572 | Cytoscape fails to apply edge style when loading session |
| 2583 | Command line dialog does not display status messages during task execution |
| 2584 | Importing table or network from command line does not work if delimiter is COMMA |
| 2594 | Issue using group through command  line dialog - collapse command doesn\'t show … |
| 2597 | Commands do not check input parameters before running tasks |
| 2600 | [Table import] Changing the list delimiter for a column causes the primary key mapping … |
| 2626 | Add Node Charts to VizMapper |
| 2644 | Exceptions thrown by ContextMenuFactories cause node/edge/network context menus … |
| 2647 | Once a group is created and collapsed loose visual style on the edges |
| 2671 | Edge Color is not refreshing |
| 2685 | Data-type error while importing tables from file |
| 2701 | CySessionManagerImpl.restoreProperties() re-registers CyProperty services |
| 2721 | -S/--script command line option does not handle file paths correctly |
| 2726 | Broken network view when creating subnetwork ("__Annotations column already exists" error) |
| 2727 | Java 8 support |