ACT-R Software Updates 2018

Dan Bothell
Carnegie Mellon University
July 21, 2018

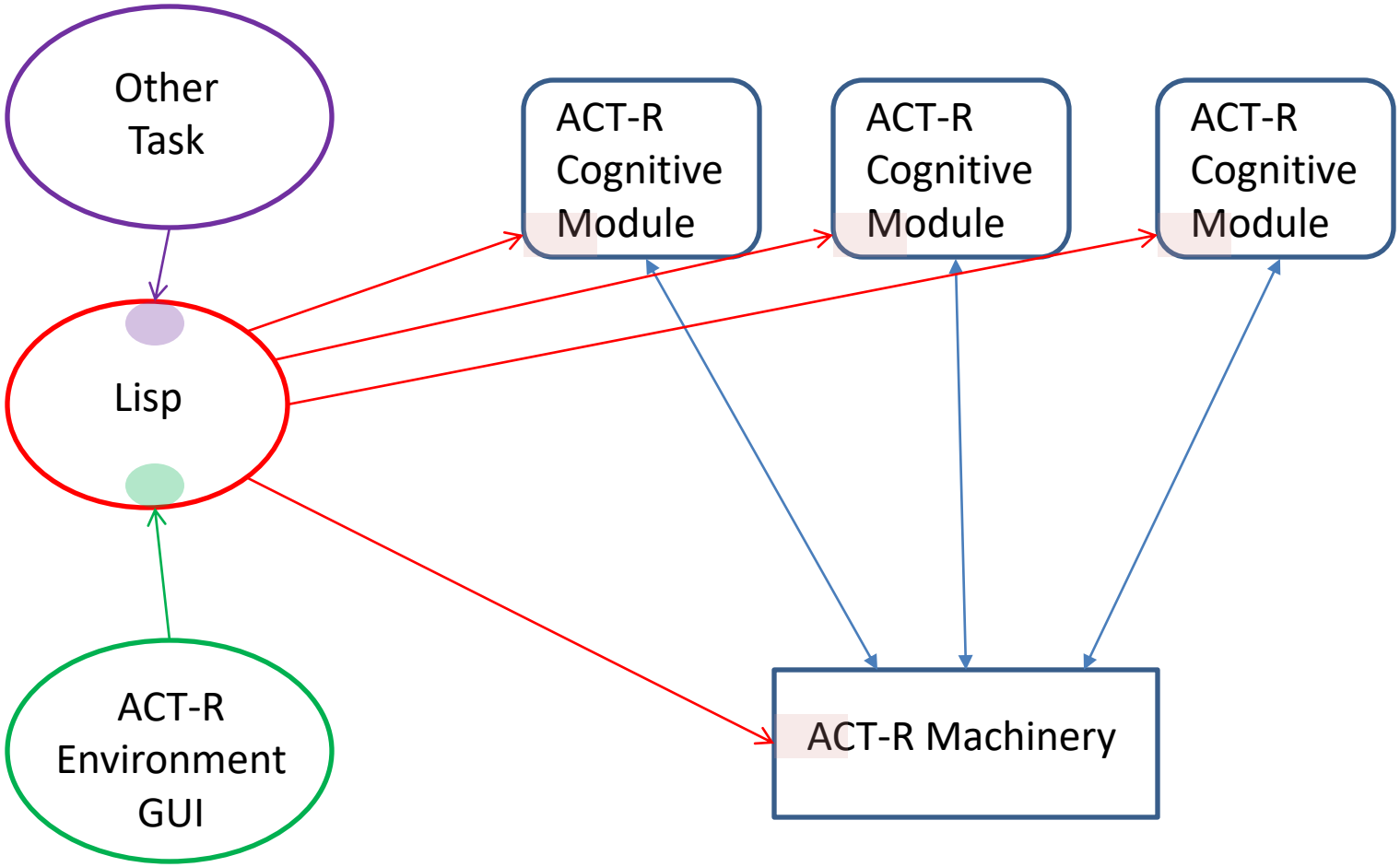
Current Software

- Last year’s workshop
  - 7.5-<2244:2017-07-11>
- Now
  - 7.5-<2244:2017-07-11>

- Two minor bug fixes
  - Production compilation
  - -location buffer unstuffing

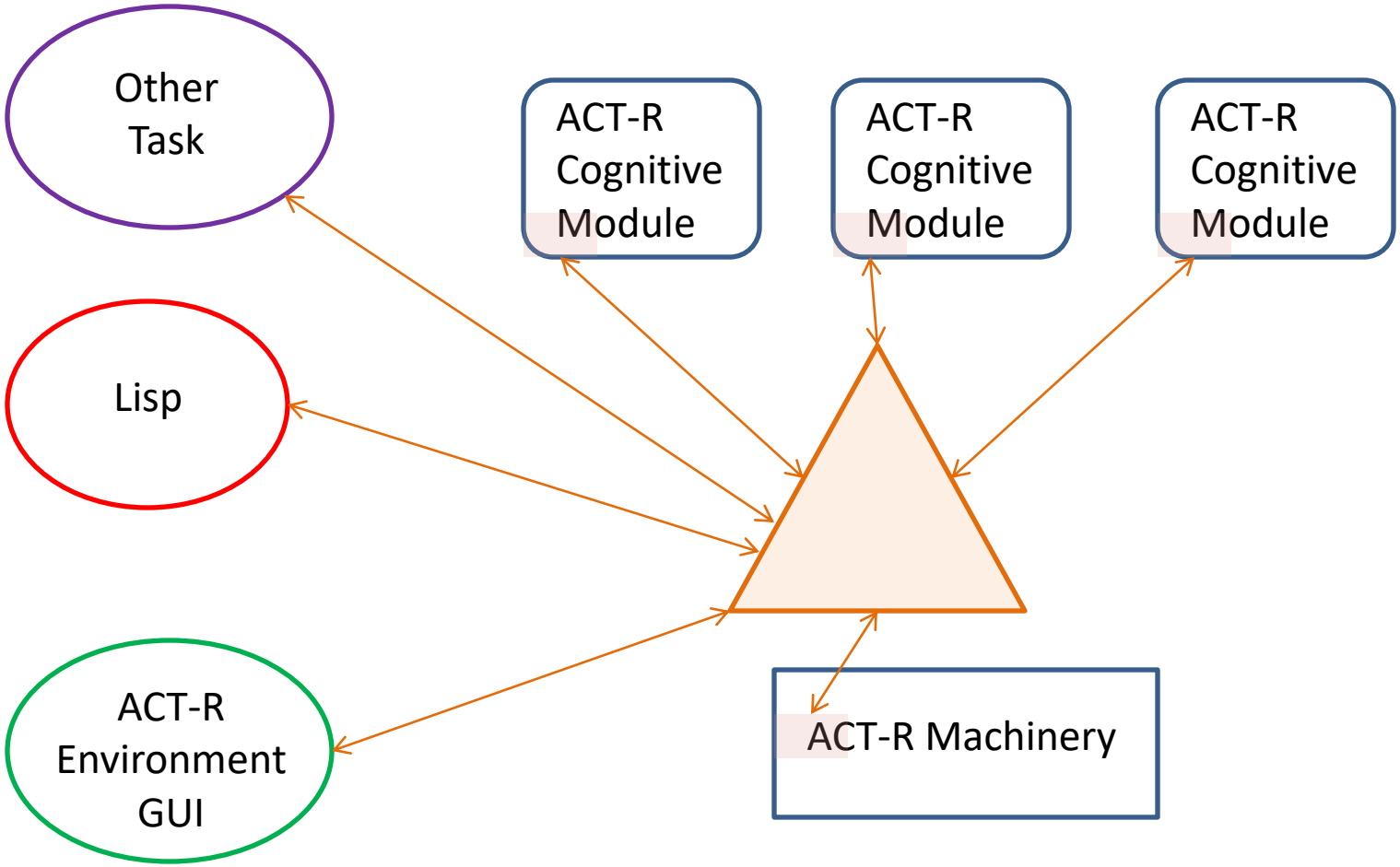
New Software

- Address the complaint that ACT-R is “in” Lisp
  - Lisp is the interface for working with ACT-R



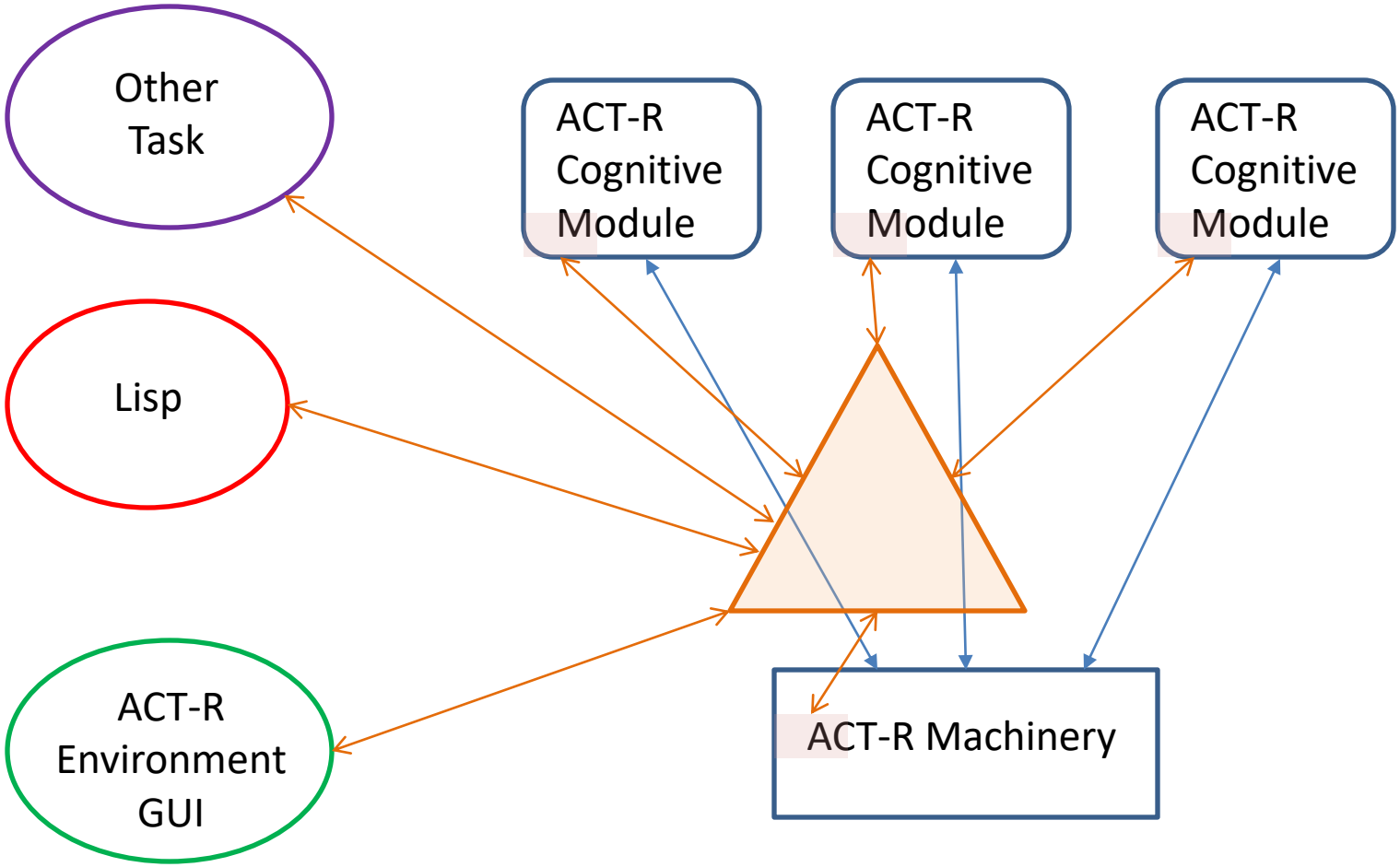
New Software

- Create a new interface through which things can communicate



New Software

- For practical reasons some internals still best communicating directly



Dispatcher

- A simple RPC server
  - ACT-R TCP/IP server connection
  - Subset of JSON RPC 1.0 for communication
- Small set of actions to coordinate operations
  - Add, remove, call (either direction), monitor
- Details in the docs/remote file

Current Status

- ACT-R 7.11.1-<2629:2018-07-17>
- Usable
  - Used in cognitive modeling class and summer school
- Enough external access
  - Tutorial tasks
  - Implement goal module
  - All Environment functionality
- Includes a Python client and interface library
  - All tutorial *tasks* have been reimplemented completely in Python
  - Example replacement goal module in Python
- Still needs some work
  - Reference documentation
  - Extras and examples

Important Differences

- Asynchronous models
- Performance
- PM modules' interface

Asynchronous Models

- Multiple clocks & schedulers (meta-process)
- No longer available internally
- Can be implemented externally
  - Connect multiple ACT-R instances

Performance

- General updates
  - Better concurrency safety
  - Safety checks on input
  - Error handling
- Dispatcher overhead
- External connection costs
  - ~.3ms round trip for RPC call

Rough Performance Measures from Tutorial tasks (new/old)

- Best case .35
  - Unit 1 models from Python vs ACL w/IDE
- Worst case 16
  - Unit 5 1hit-blackjack from Python without caching similarity values (8 if cached)
- Average Lisp based tasks 1.75
- Average Python based tasks 3

PM modules' interface

- Complete overhaul of the *device* construct
  - Monolithic Lisp object with specific methods called by the modules
- Separate interfaces for each module
- Devices decouple the modules from the world

Action modules

- Perform the action (peck, ply, speak, etc)
- Installed device (keyboard, mouse, joystick, microphone) converts that to an action
- Provided devices make the action available through the dispatcher for monitoring

Attention modules

- Audio already only had specific sound commands

- Vision had both device and direct commands
  - Only use the direct commands now
  - Don’t need proc-display
  - Some functionality not yet implemented (sub-letter features and scale phrase)

AGI still available

- Create simple tasks with an *experiment window* device

- Built specifically on the virtual windows
  - Provides an interface for mapping to real windows
  - Visible-virtuals through Environment included

AGI differences

- Multiple experiment windows can be installed
  - All provide model with visual features
  - Feature locations in global coordinates
    - Consistent with the mouse device
- Specific Lisp GUIs no longer part of the system

Near Future

- End of this year
  - 7.5 Moves to old software
  - 7.11^{+} Becomes the current version