Sparkle:
A PbO-based Multi-agent Problem-solving Platform

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(joint work with Chuan Luo)

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Success!!

[This slide was not used during the presentation; it was added to make it easier to follow the slide deck.]

Q: How do we know (as a community) that we've succeeded?

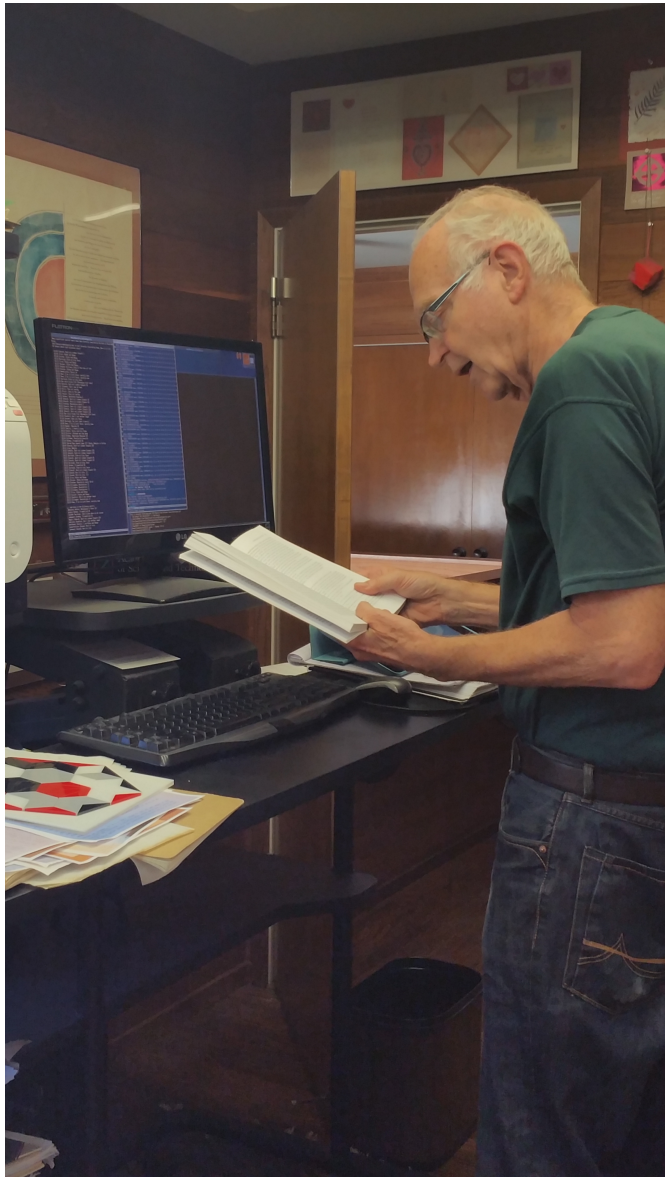
A: By having the very best (and prominent) folks
in the field endorse our methods.

In this case ...

"Parameter optimization for general broad-spectrum use is a daunting task [...]

How could then *any* set of defaults be recommended, without an enormous expense of time and money? Fortunately, there's a way out of this dilemma, thanks to advances in the theory of learning."

Donald Knuth, The Art of Computer Programming,
Vol. 4, Fascicle 6, p. 125

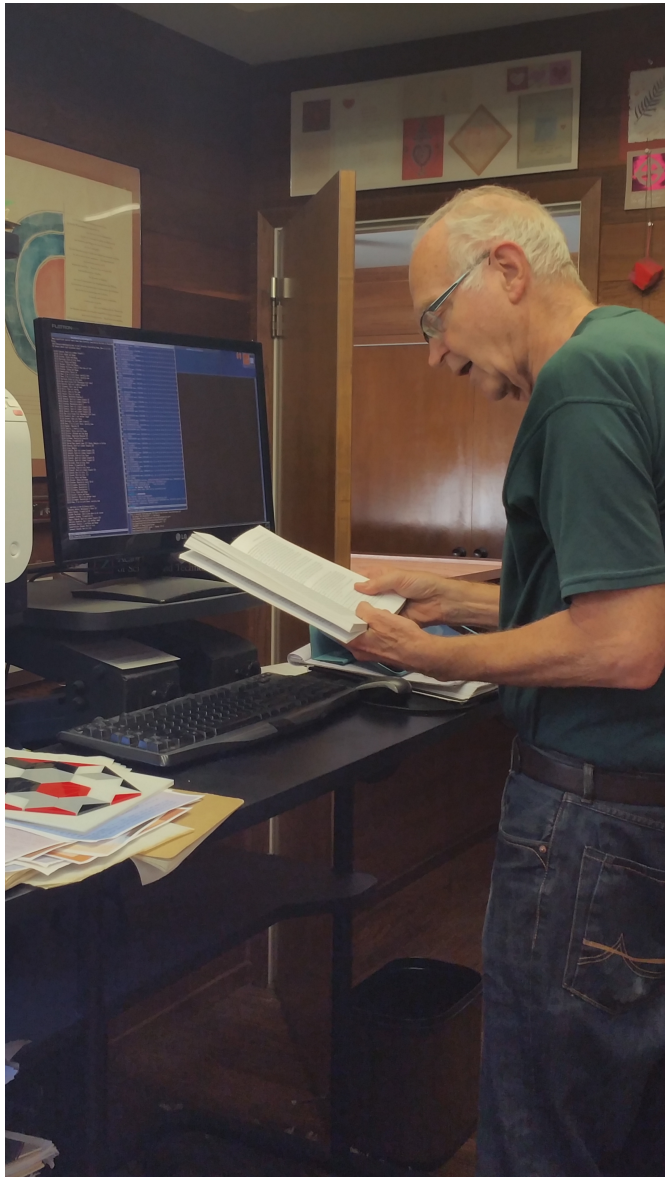


"The overall champion in 2007 was SATzilla, which was actually not a separate SAT solver but rather a program that knew how to choose intelligently between *other* solvers an any given instance. [...]

This 'portfolio' approach, which tunes itself nicely to the characteristics of vastly different sets of clauses, has continued to dominate the international competitions ever since.

Of course portfolio solvers rely on the existence of 'real' solvers, invented independently and bug-free, which shine with respect to particular classes of problems. And of course the winner of the competition may not be the best actual system for practical use."

Donald Knuth, The Art of Computer Programming, Vol. 4, Fascicle 6, p. 132*f.*



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$\rightsquigarrow$ PbO (everyone should use it)

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- ... often don't reflect state of the art
- ... typically don't provide effective incentive to improve state of the art

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  - ...
- full credit for contributions to selector performance goes to component solver authors

$\rightsquigarrow$ Sparkle (Luo & HH – planned for 2018)

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Standard competition (as in Olympic games):
One participant (winner) gets all the attention.

(#2 and #3, though on the podium,
don't get much glory compared to #1.)

Instead of giving one gold medal, using Sparkle,
we cut it up and give every participant a chunk
that corresponds to their contribution to
the state of the art in solving a problem.


1
2
3


XVI TH
OLYMPIAD
MELBOURNE
1956


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Live demo of current prototype:
- add instances, solvers, feature extractor
- build selector
- assess solver contributions
  to VBS and selector

Note: this happens highly efficiently on
our cluster in Leiden

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- makes it easier to gain recognition for specialised techniques
- provides incentive to improve true state of the art

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- continuous solver evaluation (as community service)
- configurator / selector competitions
- experimentation platform for algorithm configuration, selection, programming by optimisation
- support deep optimisation:
  high-level design choices, ..., compiler options
  (Fawcett, Kotthoff, HH – coming soon;
  Pérez Cáceres *et al.* 2016; Fawcett, Kotthoff, HH 2016)

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- `bettersci.wordpress.com`