Research Challenges and Remarks on CP

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Questions

- Automata: Propagate by declarative automaton *generators*
- Verification: Verify propagator properties (correctness, etc)
- Synthesis: From a declarative constraint specification:
  - Generate a (solver-independent) propagator
  - Generate a visualiser
  - Generate explanations (also from a high-level propagator)
- Scalability: Design propagators that perform limited propagation (while satisfying some side constraints)

Reconstruction of the Global Constraint Catalogue

The Global Constraint Catalogue was enriched with a lot of meta data: the latest working version is always at
http://www.emn.fr/z-info/sdemasse/aux/doc/catalog.pdf
and currently has 3,289 pages.

A community effort should now be started to:

- Identify more core concepts (such as ALLDIFFERENT)
- Define derived concepts applying across all core concepts (generalisation, specialisation, open and soft variants, . . .)
- Maintain links to modelling languages and libraries

Towards the Development of *Sustainable* CP Solvers

- Promote source code to be associated with submitted and published papers on algorithms;
  see for instance Prosser's Technical Report 2012-333
- Promote open-source solvers,
  such as Choco, ECLiPSe, Gecode, JaCoP, and Minion
- Promote solver-independent algorithms
- Promote declarative propagator descriptions

Interface of CP with Other Computer Science Areas

- Organise out-reach meetings with experts of CS areas, such as *CP meets ML* and *CP meets CAV*
- Develop on-line material explaining CP to CS *experts*
- Maintain a showcase of *significant* benchmarks where:
  - CP solvers outperform other solvers
  - CP practitioners challenge practitioners of other solvers

  Cooperation with at least the SAT, SMT, MIP communities
- Limit impact of absence of standard interface to CP solvers

Answers to Pascal's Questions

- Where can CP make significant contributions?
  Integration of combinatorial problem solving technologies (CP, LS, MP, SMT, ...)
- What technical steps are needed for such contributions?
  Compilers and interpreters of declarative formulae for the different technologies
- What would CP offer compared to other technologies?
  Versatility: different models, inference, search, etc