

2022 survey of prolog applications

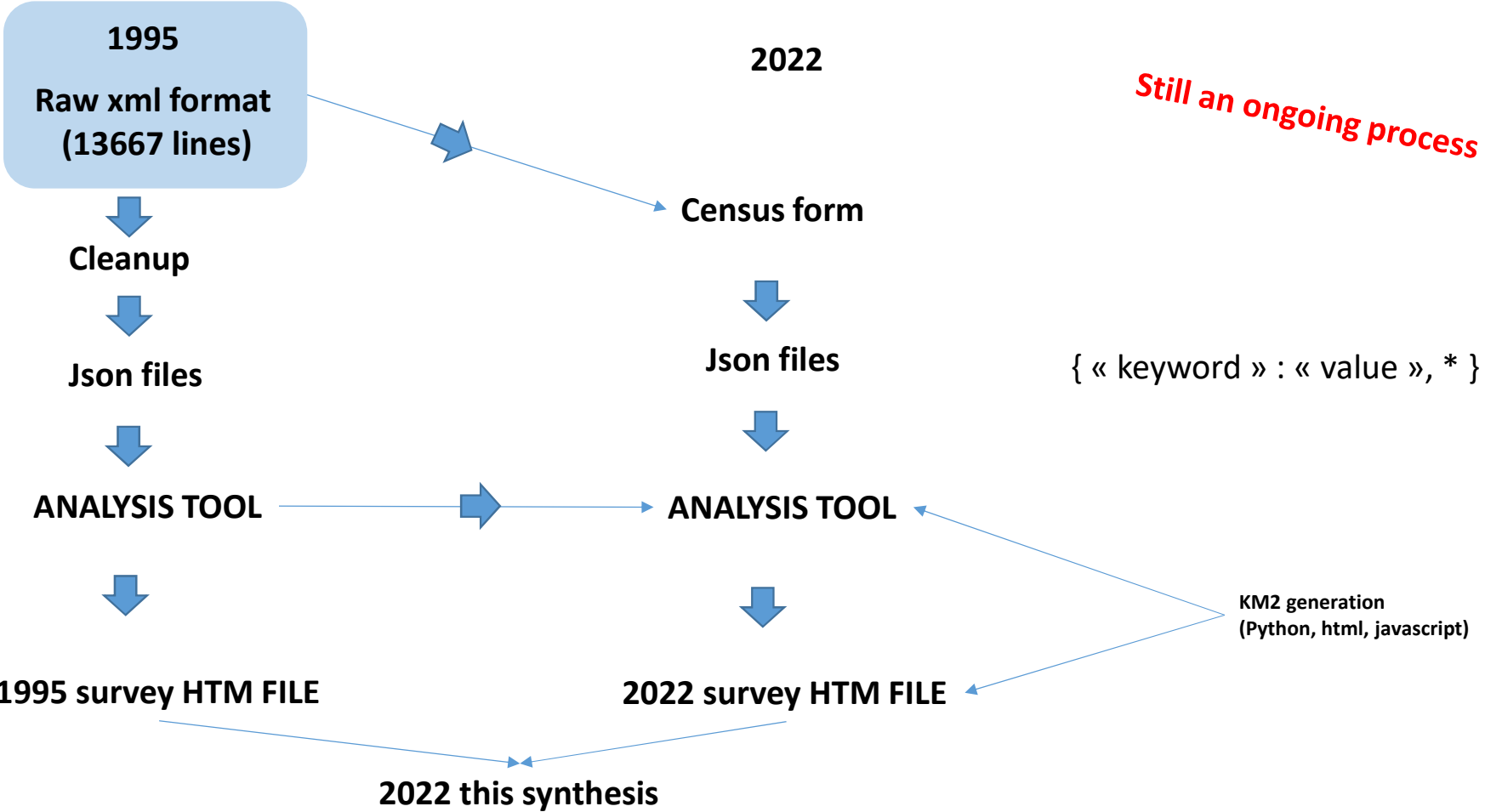
**Laurent Gouzenes,
KM2 Conseil
Knowledge Management 2nd generation**

The slides and the census are available here :
<https://prolog.academy>

Why a survey ?

- Update of the 1995 survey
- Need to understand the practical applications
- Identify strengths and weaknesses
- Identify opportunities
- Dissemination of useful knowledge

Methodology : General process



Methodology : census form

APPLICATION

Information about the application

name Name of application - no special chars
teaching education banking etc

domain what it is supposed to do

purpose some hints on how it works

description some references if any - for readability please number references with [1] [2] etc

references Personal use/ in-House use / Free/public domain/ Licensed/ Sold product ... and/or more information

use

DATES

year the application was developed, date of today

year today

range_deployed **range_development**

DEVELOPMENT INFO

country **organisation**

some names

developpers

COMPLEXITY

predicates **lines** (give approximate numbers)

development_effort **maintenance_effort** (in men-year)

prolog **platform** **other_languages**

CONTACT

contact (name)

address **email** **telephone**

INSTRUCTIONS

- The VALID button will show in the RESULT frame was will be sent, but does nothing else.
- The SEND button will open a "mailto:" window
- Before hitting SEND, please check with VALID that your answer is correctly treated

If the MAIL window does not open (depends on your browser) , then just copy/paste the content of the RESULT frame (below) in a mail, and

- send it to Laurent (lgouzenes.net at gmail com)
- with subject=prolog applications census 2022

- Please comply with the json format, Do not send in pdf format

RESULT

no result

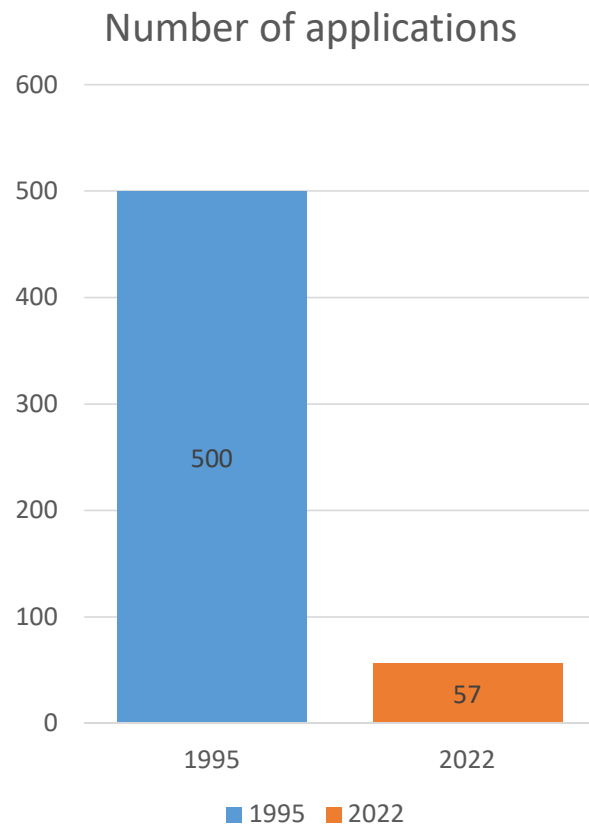
INSTRUCTIONS FOR INPUTS

Field	info	example
references	some text, possibly with comments. you may refer to web addresses for tutorials, github, etc. you may use some html tags like br, strong, ... number references [1] , [2], etc .	public communicaion ACL 2019, Conference of ... see documentation here https://www.somewhere.com/application.htm
today	today when you fill the form. Format dd/mm/yyyy.	18/02/2022
year	year of reference the year the application was publicized and considered as available.	2015
range_deployed	range year of start -year of end (or now) the years the application is/was in use	2009-2022
range_development	range year of start -year of end (or now) the range of years the application was in evolution	2007-2010
DEVELOPMENT INFO	information about the designers/developpers of the application	David Warren developed the WAM.
COMPLEXITY	if more comfortable, you may give other units but give the units !	Total source 1 M lines, Prolog lines about 100 Klines
prolog	describe the version / variant	SICSTUS prolog SWI-prolog etc

Same census form 1995/2022

Census form

FIRST RESULTS



BUT

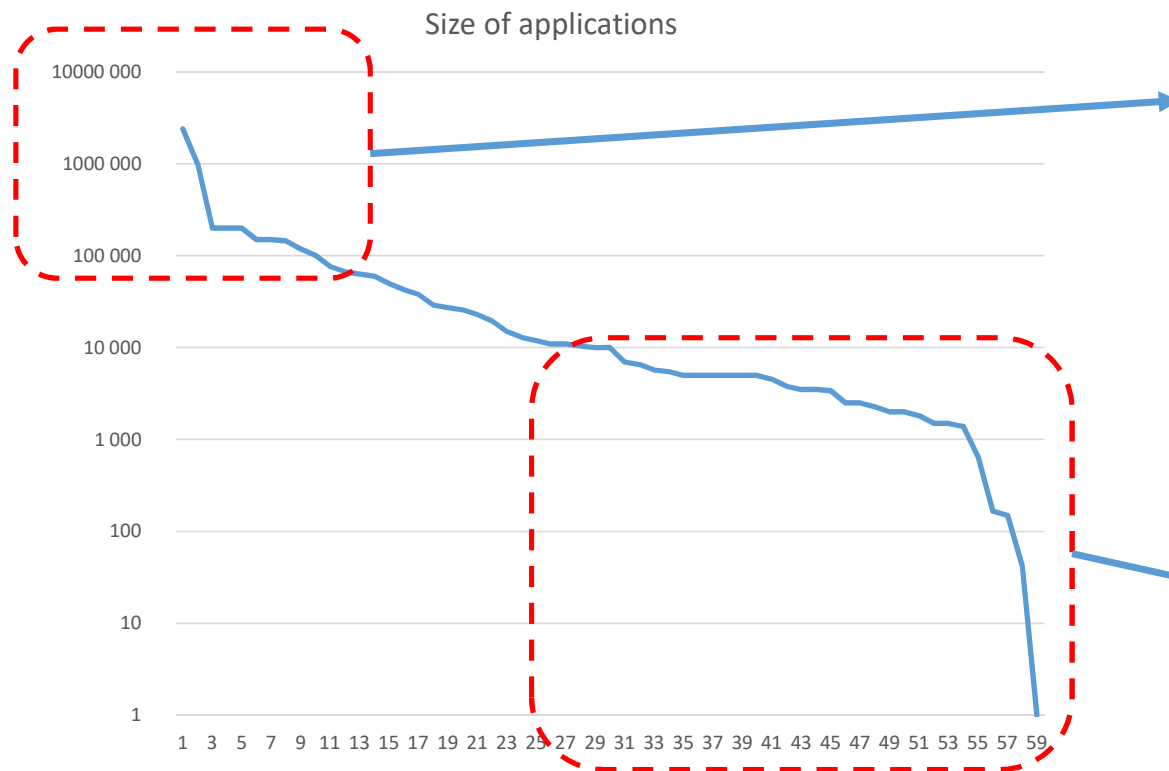
Still an ongoing process !

BIAS ?

- was the survey not efficient enough / too early at this stage ?
- -Mostly educational sources
- Are all dialects of prolog, and notably extensions, really considered ?
- Application based on extensions of Prolog not all received.
- Many applications rely on tools written in Prolog
- Prolog as a best kept secret for some companies ?

Size of applications

Follow a classical exponential pattern



20% are large or very large applications > 100 k lines

2 applications above 1 Million lines :

- Alpino : dutch generator
- PROSYN : expert system in chemical industry

50% are < 10 k lines

Variants of prolog and platforms used

Main variants of Prolog used in applications (so far)

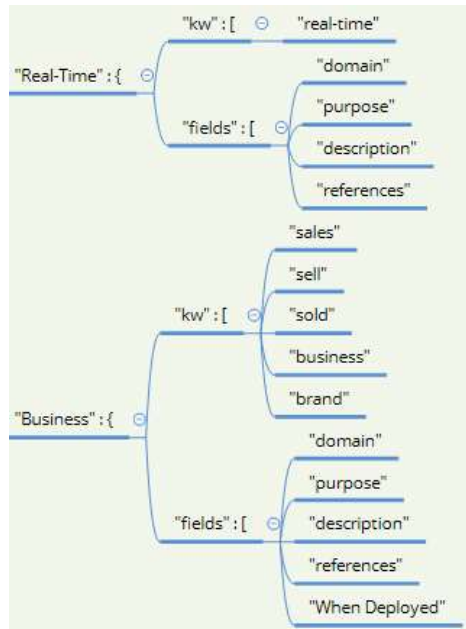
Language/tool	Quantity
ciao	18
sicstus	11
swi	12
unknown	13
xsb	11

Platform statistics :

Platform	Quantity
any	8
apple	23
linux	34
unknown	0
web	5
window	45

Application by domains

Domains are defined by some keywords that must be present in the description, references, etc



Result :

----- Business (4 projects) , keywords : sales, sell, sold, business, brand -----

▼ Détails

[Company Name Standardizer](#) (When Deployed,brand)
Supply Chain Management

[NeuralTax](#) (When Deployed,brand) accounting, legal
[Price Grouper](#) (When Deployed,brand) Parts
Management

[SIGOLI](#) (When Deployed,brand) computational
molecular biology

----- Classification (2 projects) , keywords : classif -----

► Détails

----- Decision (5 projects) , keywords : decision -----

► Détails

----- Design (6 projects) , keywords : engineering, architecture, CAD -----

▼ Détails

[Alpino](#) (references,engineering) unknown domain
[CASSANDRA](#) (references,CAD) Software & Systems
Engineering

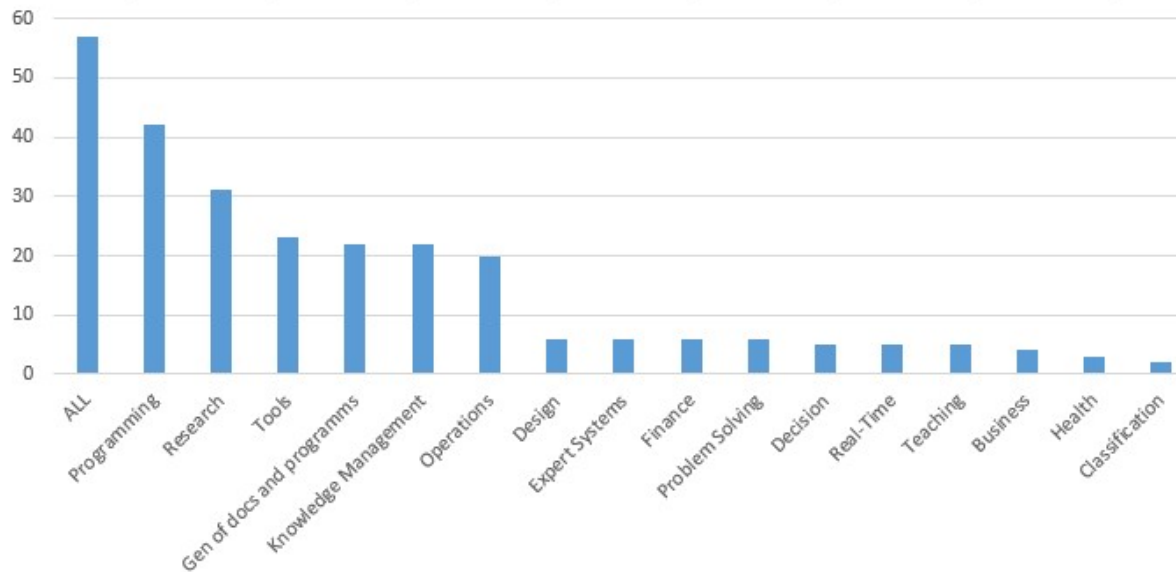
[Flex Expert System toolkit](#) (references,engineering)
Knowledge-based Expert Systems
[IBM Watson](#) (references,architecture) question answering
[PROSYN](#) (references,CAD) Process Engineering,

Chemical Industry
[Spacial](#) (references,CAD) design expert systems tools

Application by domains

2022

Operations (20 projects) , keywords : operations, activit, process, daily, monthly, real-time .



Real-Time (5 projects) , keywords : real-time .

- Scheduling (2 projects) , keywords : schedul .

- Research (31 projects) , keywords : university, research, proof, proving, formal

· Generation of documents and programs (22 projects) , keywords : generat, document, parse, parsing

Comparing the spectrums of applications

1995

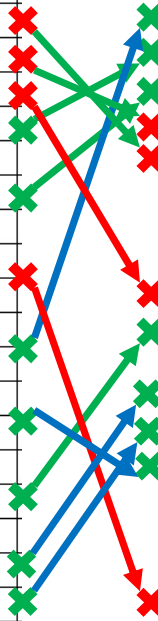
TOTAL : 502 projects.

Domain	%	# Projects
Programming	43%	217
Operations	25%	129
Knowledge Management	23%	120
Expert Systems	17%	87
Tools	13%	67
Problem solving	11%	58
Generation of documents and programs	9%	48
Design	6%	32
Decision	5%	27
Scheduling	5%	29
Legal	3%	18
Research	3%	17
Health	3%	18
Business	2%	11
Classification	2%	13
Finance	2%	13
Teaching	1%	9
Engineering	1%	9
Real-Time	1%	6
Speech	0%	1

2022

TOTAL : 59 projects.

Domain	%	# Projects	Keywords
Programming	74%	44	program, language, compil, software, specification
Research	52%	31	university, research, proof, proving, formal
Tools	40%	24	tool, platform
Generation of documents and programs	38%	23	generat, document, parse, parsing
Knowledge Management	37%	22	knowledge, representation, expert system, intelligence, ontolog
Operations	33%	20	operations, activit, process, daily, monthly, real-time
Teaching	18%	11	teach, educat
Design	10%	6	engineering, architecture, CAD
Problem solving	10%	6	sales, customer, problem
Expert Systems	10%	6	expert, advis
Finance	10%	6	loan, bank, credit, financ
Decision	8%	5	decision
Engineering	8%	5	engineering
Real-Time	8%	5	real-time
Business	6%	4	sales, sell, sold, business, brand
Legal	5%	3	legal, law
Health	5%	3	health, medicine, medical, drug, patholog, therap
Classification	3%	2	classif
Scheduling	3%	2	schedul
Speech	0%	0	speech



Applications in 2022 seem to have a wider scope

Progression of research

Bias ?

Prolog used widely for tools and research

----- Tools (23 projects) , keywords : tool, platform -----

Détails

[Alpino](#) (description,platform) unknown domain
[BIOCHAM](#) (description,platform) research and teaching
in computational systems biology
[CASSANDRA](#) (description,tool) Software & Systems
Engineering
[Causality Link](#) (description,platform) model of the
financial world
[CiaoPP](#) (description,tool) Programming Research Tools
[Cliopatra](#) (description,platform) Linked Data research
[DeepFind](#) (description,tool) Programming, Research,
Tools

[DES](#) (description,platform) Teaching, Research
[Energy Analyzer](#) (description,tool) energy, programming,
research, tools
[FSA Utilities](#) (description,tool) unknown domain
[gamemaster](#) (description,tool) General Game Playing
[GTO](#) (description,tool) unknown domain
[KALM](#) (description,platform) Natural Language
Processing
[Michelson Cost Analyzer](#) (description,tool) blockchain
programming research tools
[Muasm](#) (description,tool) programming research tools
[NtHorn](#) (description,tool) programming research tools

[PI-Horn](#) (description,tool) programming research tools
[ProB](#) (description,platform) unknown domain
[pykythe](#) (description,platform) Type inferencer and code
analyzer for Python
[RAHFT](#) (description,tool) programming research tools
[Rfuzzy](#) (description,tool) Expert systems, Programming,
Tools
[SIGOLI](#) (description,tool) computational molecular
biology
[Spectector](#) (description,tool) programming research tools

----- Research (31 projects) , keywords : university, research, proof, proving, formal -----

▼ Détails

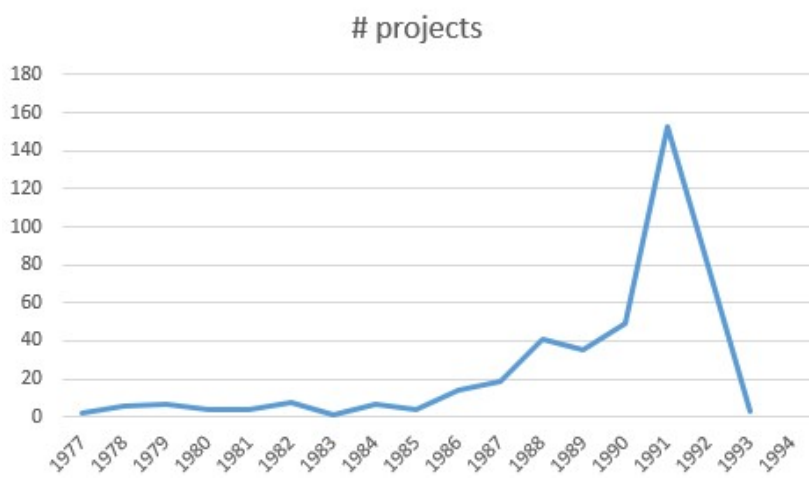
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[DeepFind](#) (organization,formal) Programming, Research,
Tools
[DES](#) (organization,formal) Teaching, Research
[Energy Analyzer](#) (organization,formal) energy,
programming, research, tools
[ErgoAI](#) (organization,formal) Higher-level logic
programming system implemented on top of XSB Prolog
used for commercial applications in: configuration
management, legal reasoning, financial planning,
reasoning in defense applications, medical diagnosis, etc.

[EYE](#) (organization,proof) industry (healthcare,
construction, ...)
[Flex Expert System toolkit](#) (organization,formal)
Knowledge-based Expert Systems
[FTCLP](#) (organization,formal) programming research
tools
[GTO](#) (organization,formal) unknown domain
[IBM Watson](#) (organization,research) question answering
[KALM](#) (organization,university) Natural Language
Processing
[LHornSolver](#) (organization,formal) programming
research tools
[LPdoc](#) (organization,formal) Programming, Research,
Tools, Teaching, Generation of documents and programs
[Michelson Cost Analyzer](#) (organization,formal)
blockchain programming research tools
[Muasm](#) (organization,formal) programming research
tools
[NtHorn](#) (organization,formal) programming research

tools
[PECOS](#) (organization,formal) Programming Research
Tools
[PI-Horn](#) (organization,formal) programming research
tools
[Pi](#) (organization,formal) unknown domain
[ProB](#) (organization,formal) unknown domain
[RAHFT](#) (organization,formal) programming research
tools
[s\(CASP\)](#) (organization,formal) Programming, Research,
Tools
[SIUE](#) (organization,formal) Higher Education
institutional management and daily operations
[Spacial](#) (organization,formal) design expert systems tools
[Spectector](#) (organization,formal) programming research
tools
[Symbium](#) (organization,formal) Computational Law
[WUENIC](#) (organization,formal) decision support

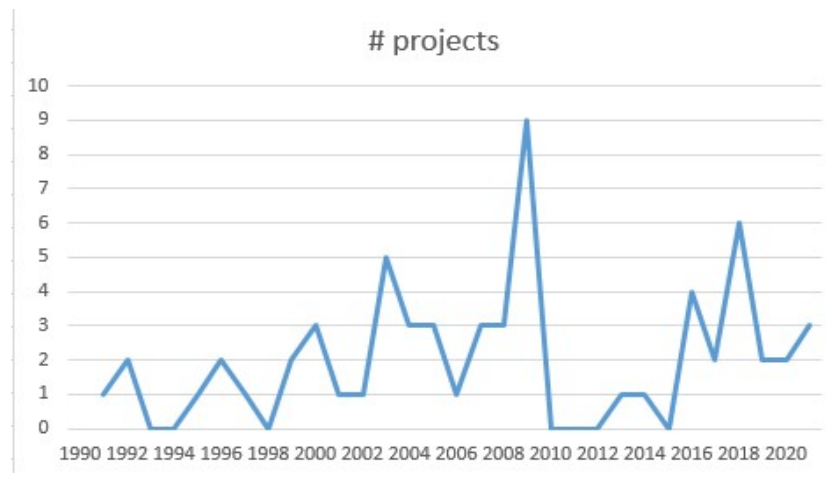
Applications by age

1995



18 years

2022



30 years

Scale / 10

Conclusions

- After the hype and fall phase of the 80's and 90's, Prolog use and popularity seems now stable, even slightly up, despite so many new 'hot' languages.
- Prolog still used to solve hard problems :
 - Used a lot in research
 - Great and difficult applications use Prolog at key points
 - Use of Tools of higher level for applications
 - Still used for AI ????
- Challenges :
 - Competing with other mainstream languages :
 - Many versions, libraries, gits, etc
 - Development tools ?
 - Prototype version in Prolog → final in another language (speed ? Maintenance ?)

**Great applications? →
See Colmerauer prize finalists session**