# Monomer.org - A Scientific Community Platform for Sharing HELM Monomer Libraries and Translating HELM Macromolecules

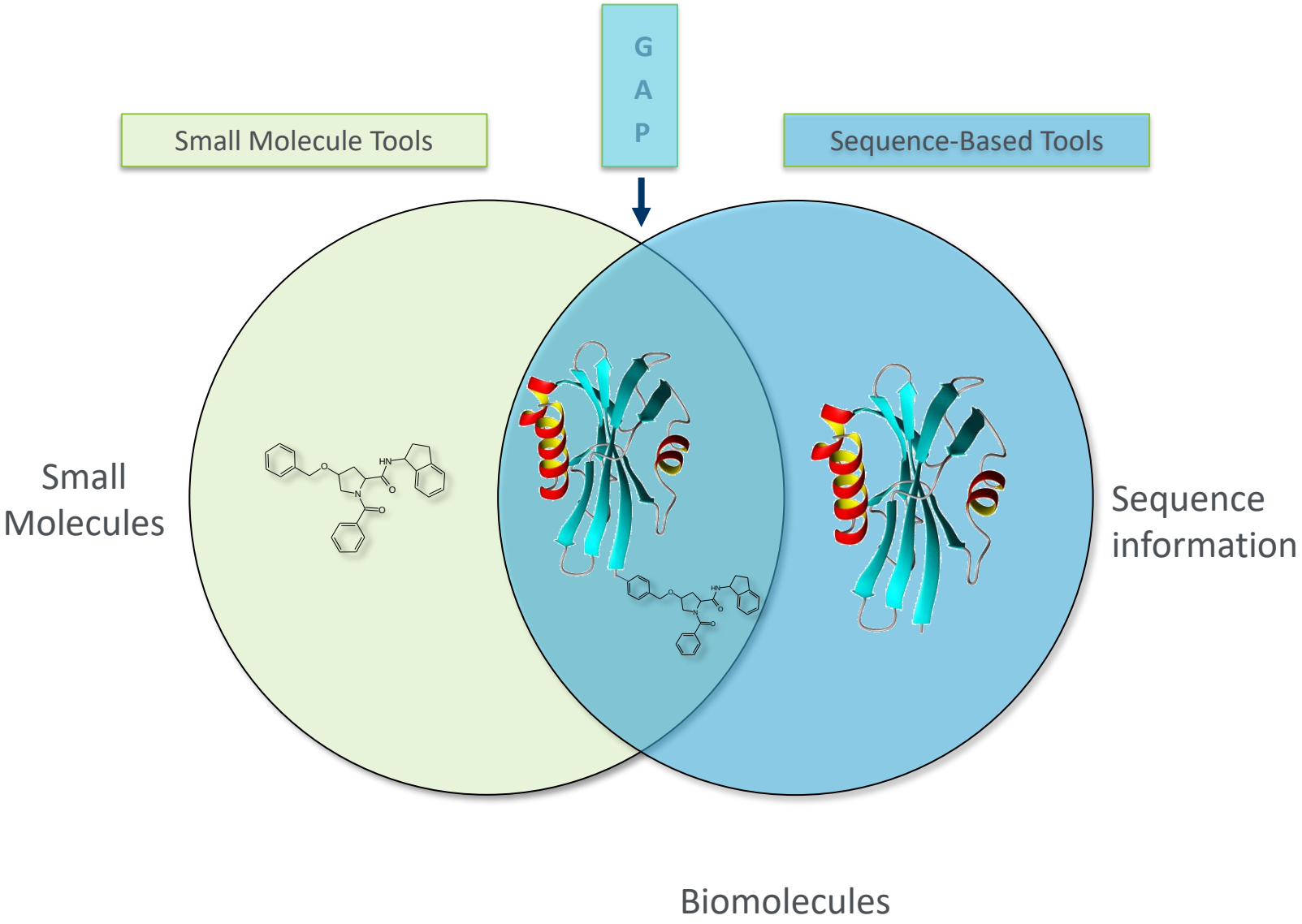
Jinbo Lee, Chief Scientific Officer, Scilligence Corporation

Scilligence

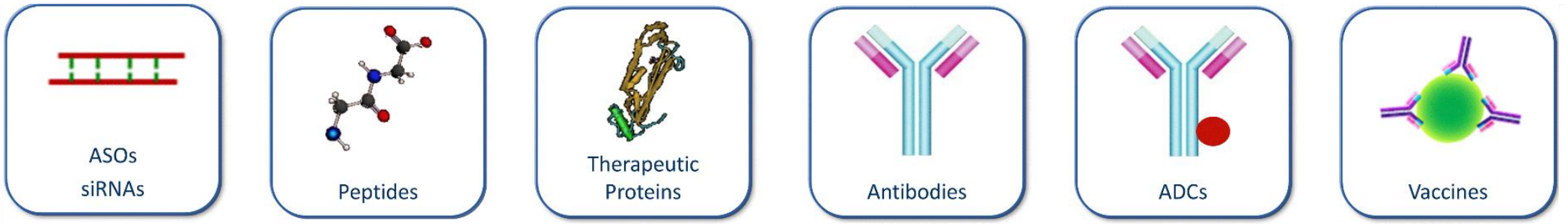
# Agenda

- ❑ What’s HELM?
- ❑ Barriers for HELM Implementation
- ❑ History of HELM Technology Development
- ❑ Development of monomer.org

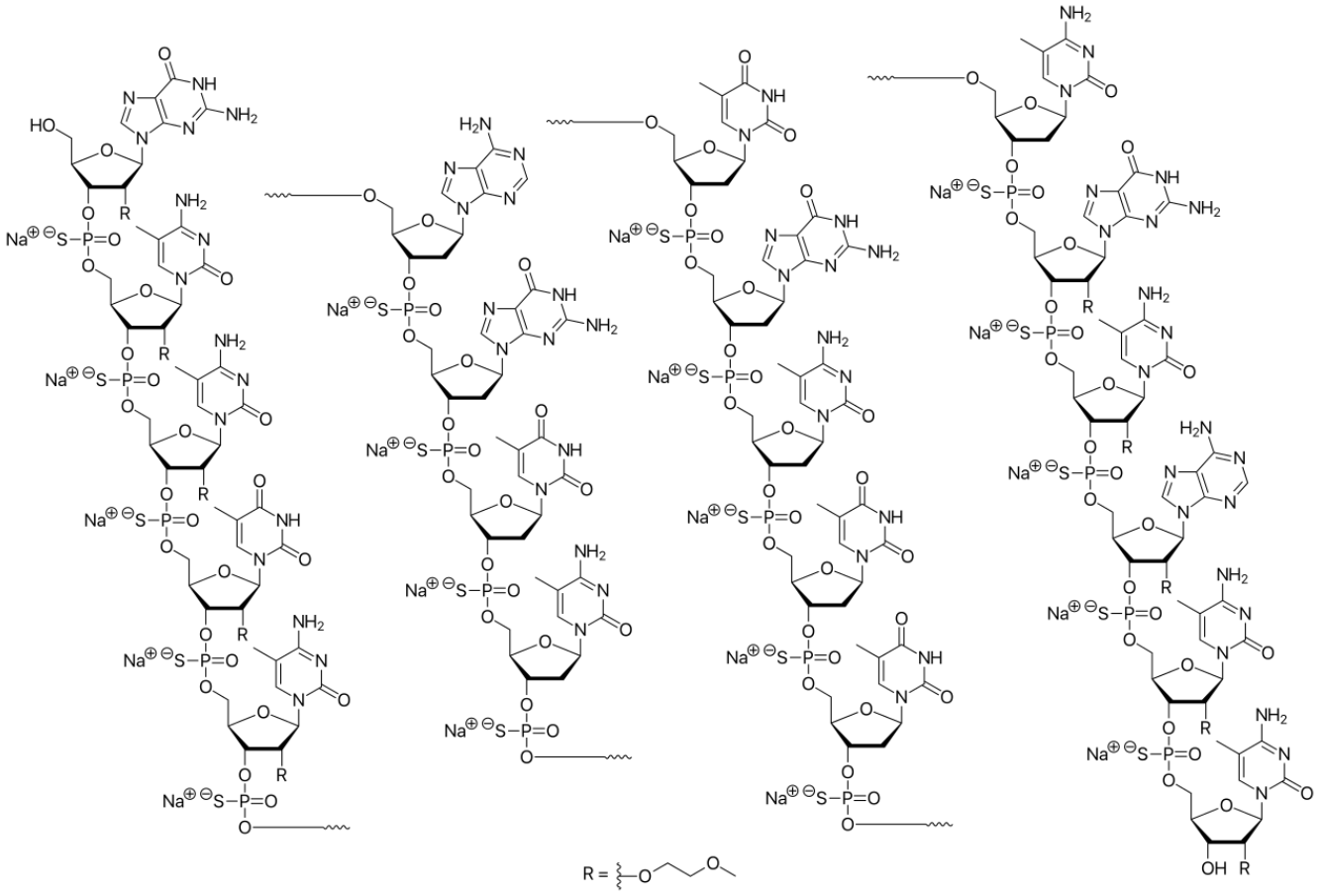
# Macromolecules – A Challenging Middle Ground



# HELM Supported Modalities

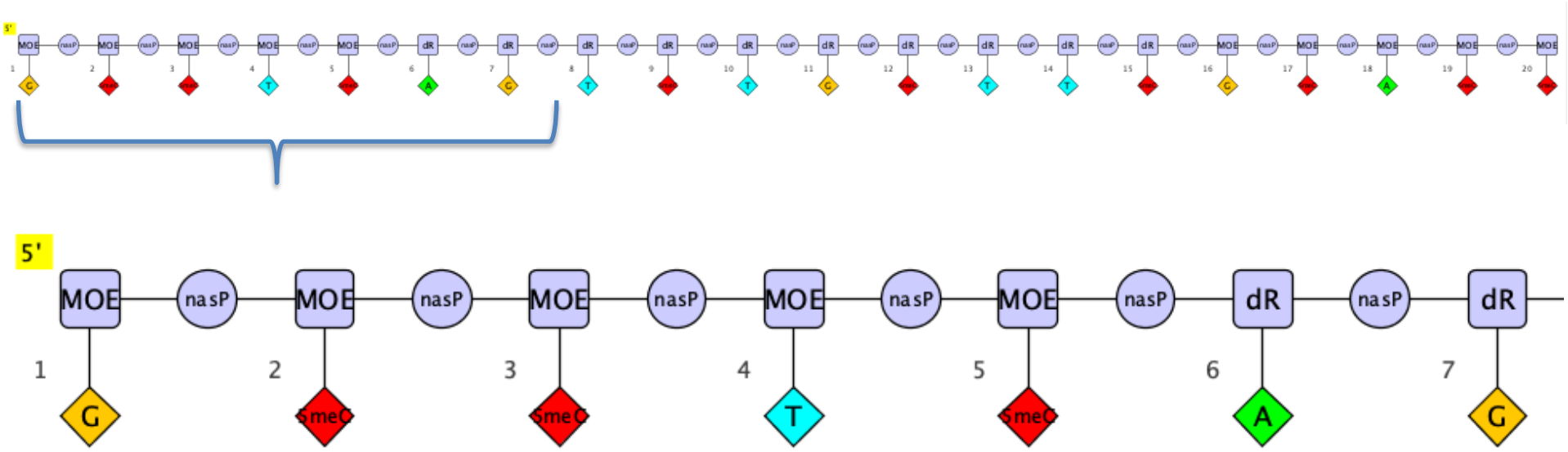


# Mipomersen – Atom-Bond Representation



- ❑ Make chemists dizzy
- ❑ Make biologists look away

# Mipomersen – HELM Representation



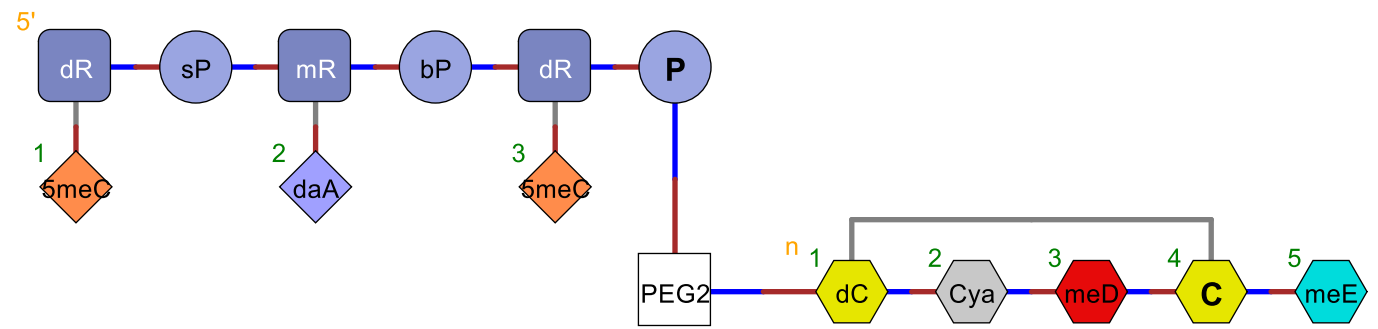

RNA1{[MOE](G)[nasP].[MOE]([5meC])[nasP].[MOE]([5meC])[nasP].[MOE](T)[nasP].[MOE]([5meC])[nasP].[dR](A)[nasP].[dR](G)[nasP].[dR](T)[nasP].[dR]([5meC])[nasP].[dR](T)[nasP].[dR](G)[nasP].[dR]([5meC])[nasP].[dR](T)[nasP].[dR](T)[nasP].[dR]([5meC])[nasP].[MOE](G)[nasP].[MOE]([5meC])[nasP].[MOE](A)[nasP].[MOE]([5meC])[nasP].[MOE]([5meC])}$$$$

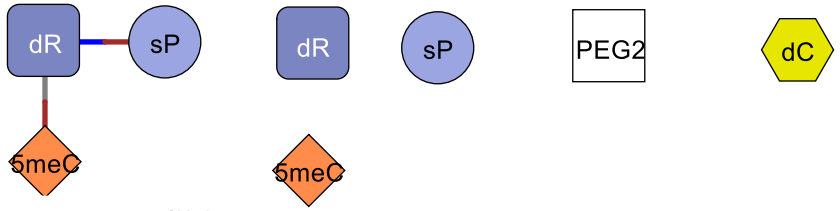
# Hierarchical Editing Language for Macromolecules

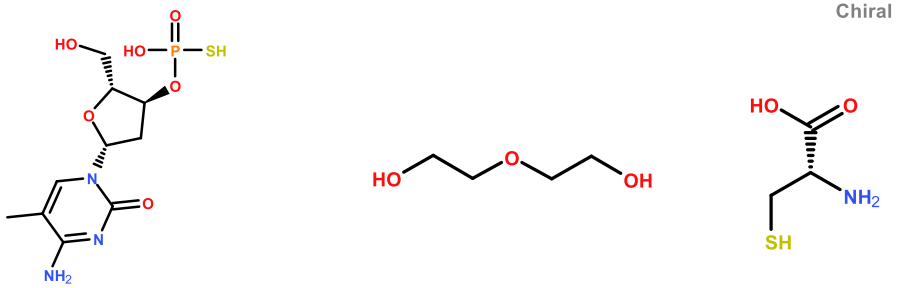
Macromolecule

Monomers

Atom-bond



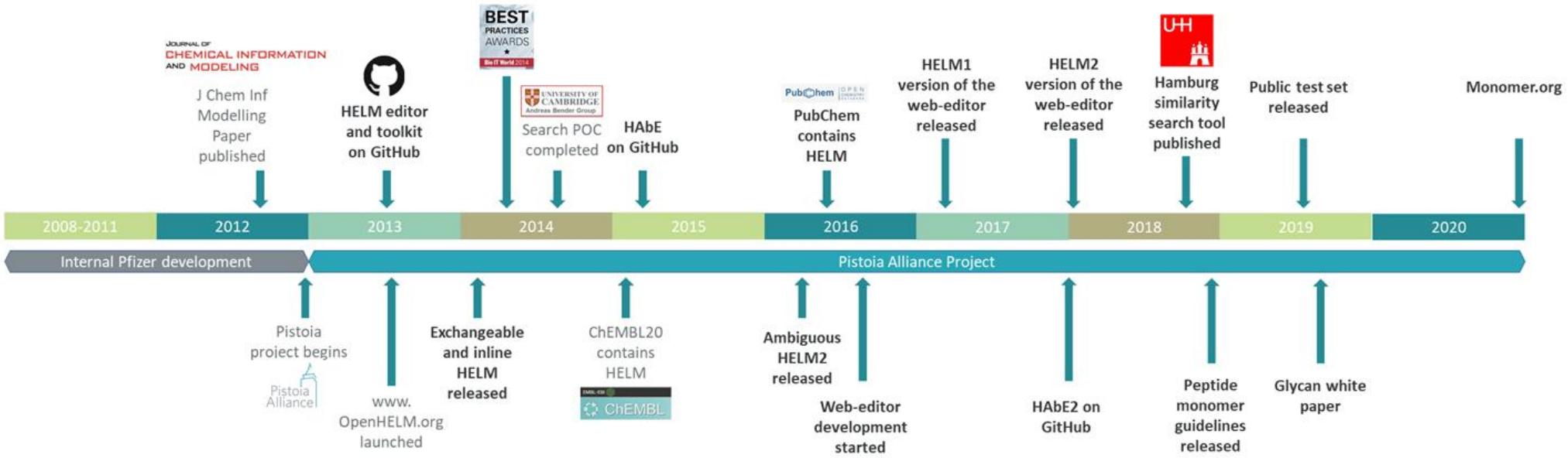
# What Do You Need for HELM Implementation?

- A database system
  - Manage and store monomer library
  - Store HELM strings
  - Interpret HELM strings
- A UI
  - Input HELM
  - View HELM structure, HELM string, atom-bond structure, sequence
  - View calculated properties

# Barriers

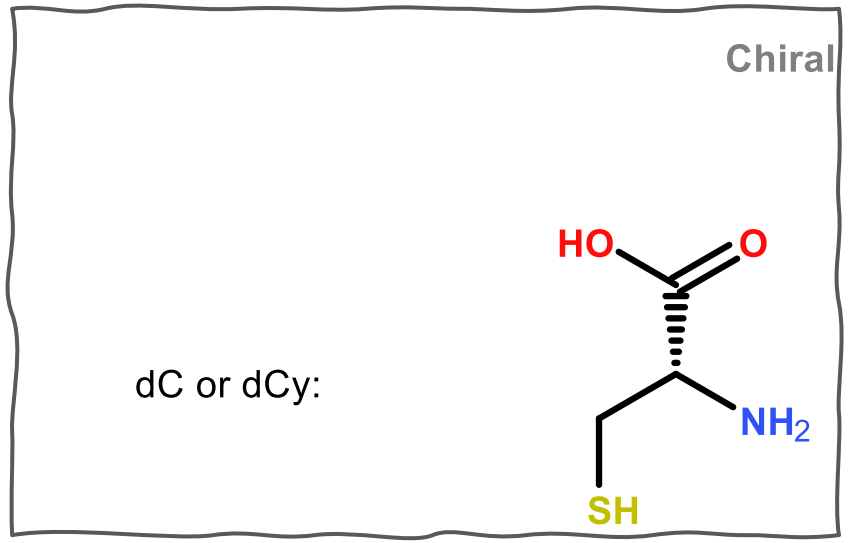
- Set up database
  - Need IT resources
  - Need informatics expertise
  - Cost for hardware and system software
- UI
  - Thick-client UI historically
  - Difficult to deploy and update
- Monomer libraries
  - Need well-curated monomer libraries and syntax for monomers
  - Need intuitive platform for managing monomer libraries

# HELM History

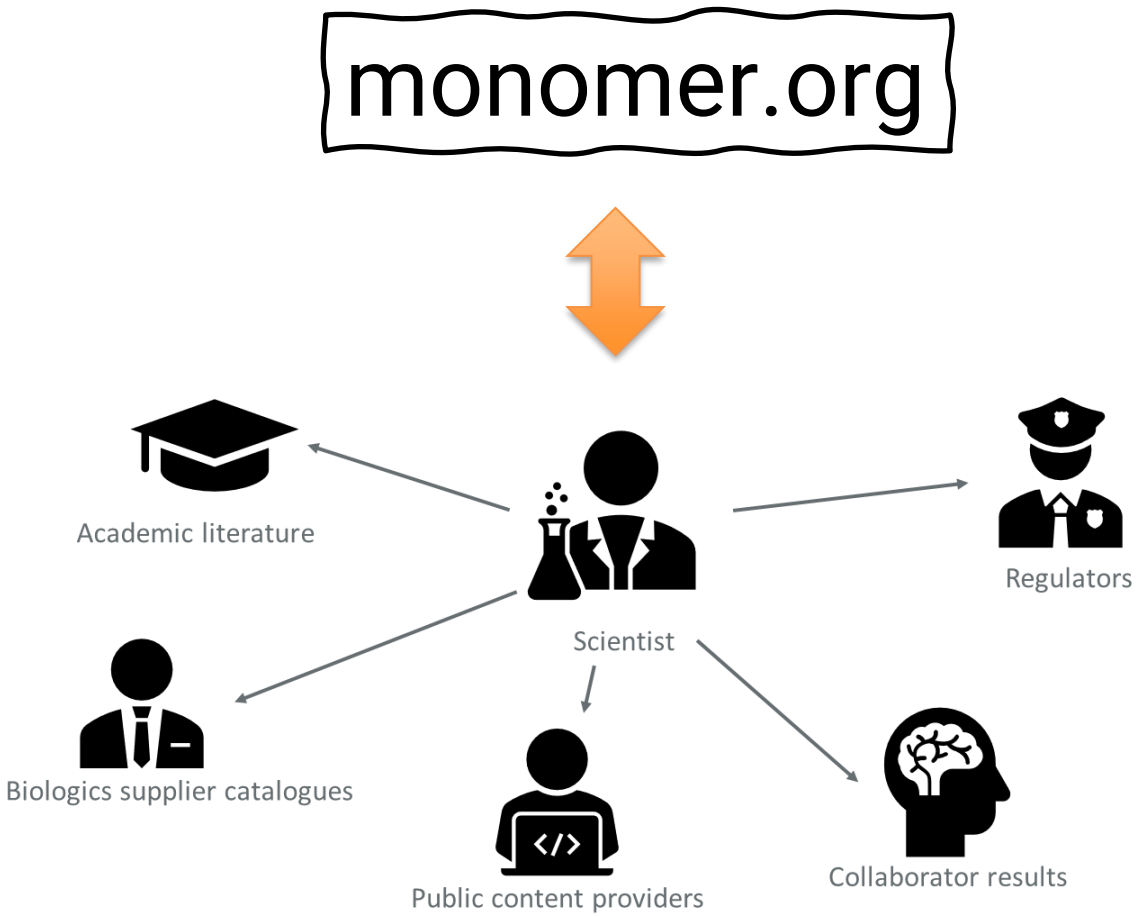


# I Can’t Understand You

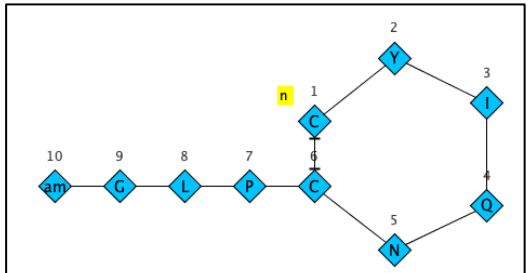
- Each company has it’s own system
  - Different monomer libraries
  - Different codon could mean the same monomer
  - Same codon could mean different monomers
- I can’t interpret your HELM string
  - Unless I have access to your monomer library



# monomer.org – A Universal Interpreter



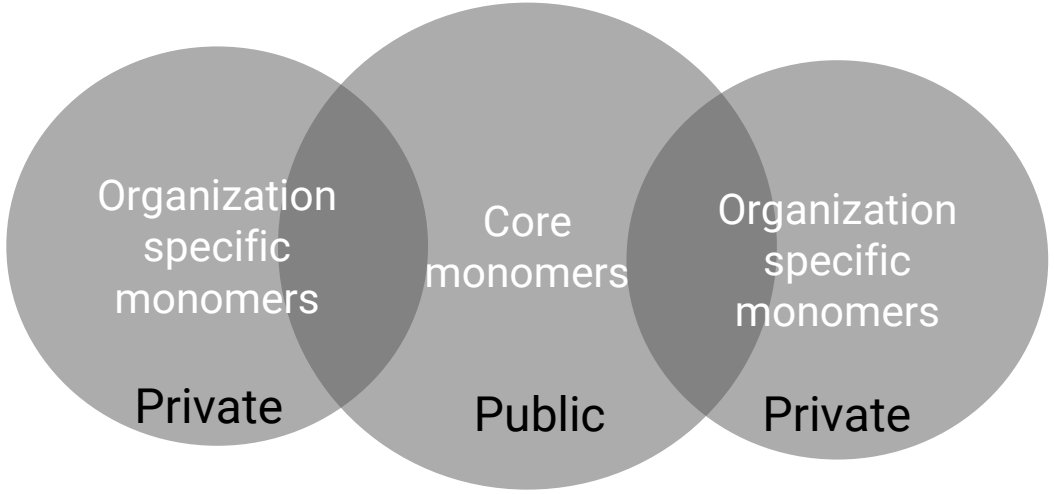

PEPTIDE1{C.Y.I.Q.N.C.P.L.G.[am]}$
PEPTIDE1,PEPTIDE1,1:R3-6:R3$$$



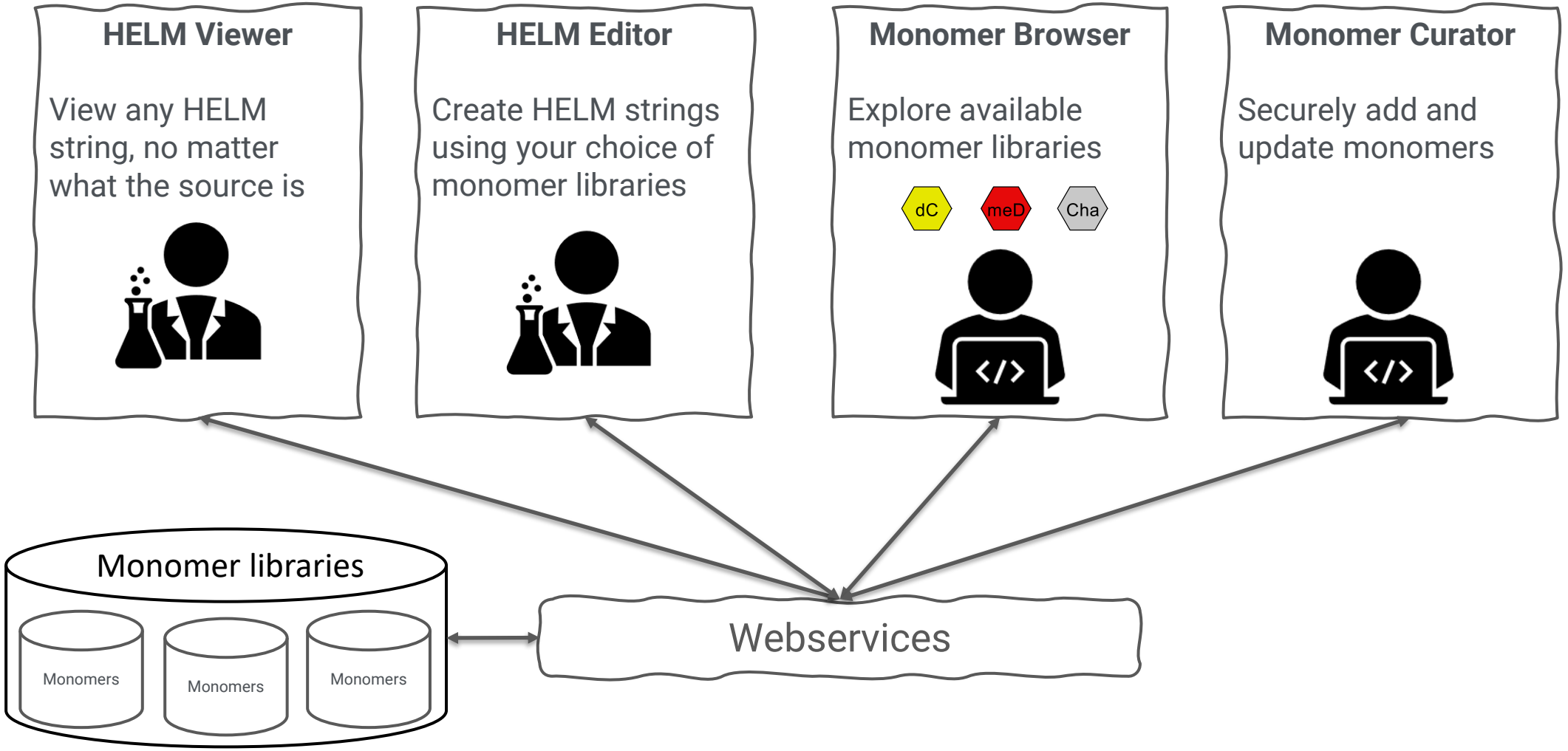

| MF | C43H66N12O12S2 |
|---|---|
| MW | 1007.19 |
| Library | helm_core.v1 |

# Monomer.org – Dictionary of Monomer Libraries

- A standard, well-curated, core monomer set for scientific community
- A hosting service for organizations to manage their monomer libraries
- Versioning of monomer libraries for backward compatibility
- Monomer libraries can be designated as public or private



# Monomer.org – A Cloud Platform for Scientific Community



# www.monomer.org

## Monomer.org

The home of HELM monomers

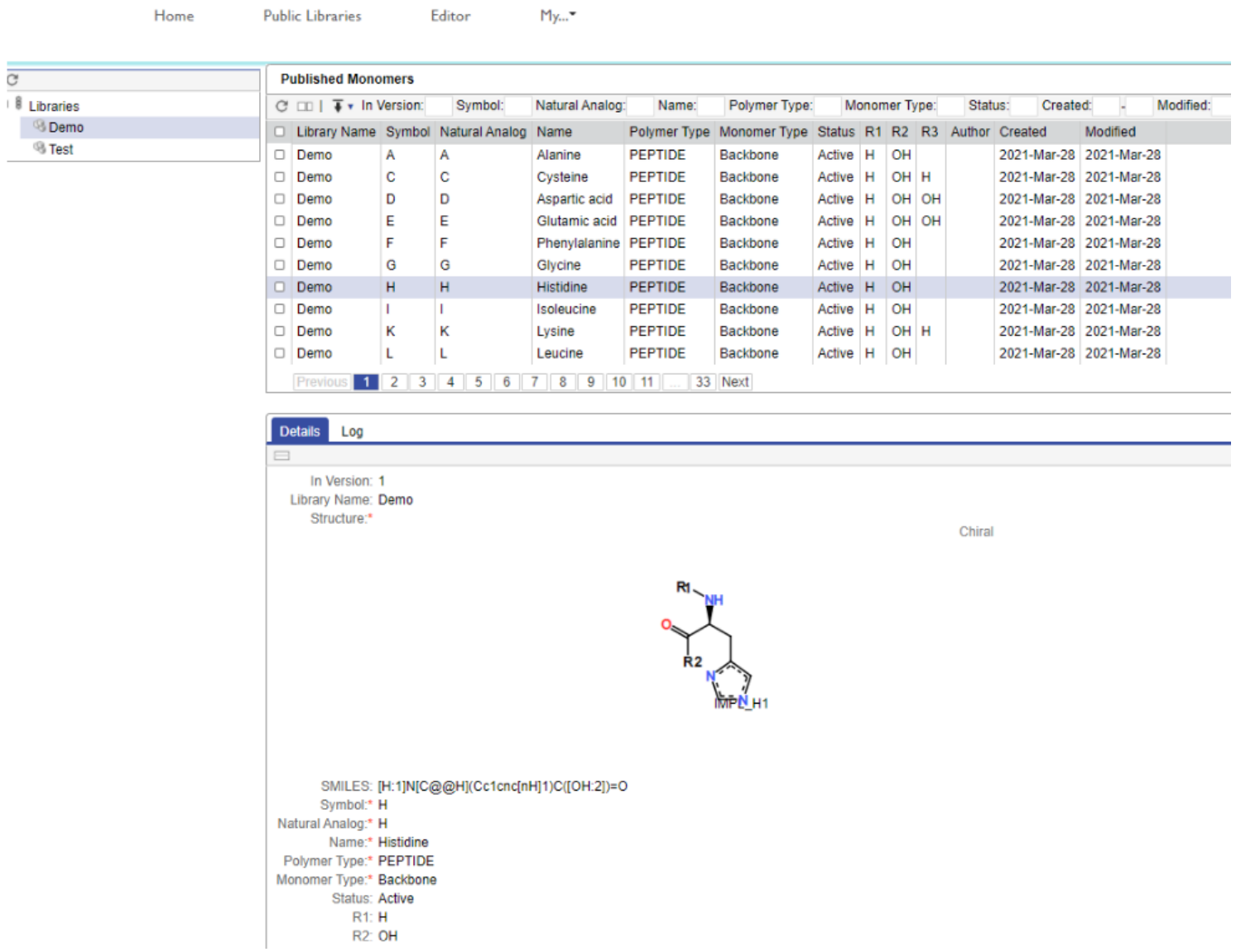
PEPTIDE1{H.E.L.M}$$$

demokey_1

Parse

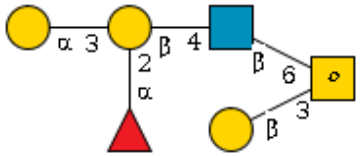

Molecular Weight: 527.6129

Molecular Formula C22H35N6O7S



# HELM is Extendable

- Extendable to support polysaccharides




- Extendable to support chemical polymers

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Scotty Blechman
Chris Ruggles