From Library Design to Compound Delivery – Data Management in a CRO Perspective

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ChemAxon User Meeting Budapest 2017
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ComInnex Overview

• 25 years of experience (as ComGenex/AMRI/ComInnex) in working with top pharma companies from US-Europe-Japan
• A drug discovery service provider for pharma, biotech and agrochemical industries:
  - Screening compound libraries
  - Novel scaffold design
  - FTE based custom chemistry and medchem
  - Fixed fee custom synthesis
• Unique combination of technologies and know-how
  - Technology-enabled chemistries
  - Integrated production IT system
  - High throughput chemistry and purification
Use Case: Compound Library Services

1. Small scale structure design
   - Focus on feasibility and novelty
   - Technology enabled aspects
2. Library building
   - KNIME workflow with ChemAxon tools
   - Data collected from the ELN and the new core design
3. Production of selected compounds
   - KNIME – ELN/LIMS connection
   - Standardization, uniqueness checking, capturing production info
4. Analysis-purification-assignment-delivery
   - „LIMS controlled”
Library Design Strategy

- Traditional chemistry sequence ensures large chemo-type diversity among key intermediates and final libraries
- Technology-enabled step with proprietary synthetic know-how
  - Enhances IP security and novelty via unique technick
  - Increases synthetic scope and success rate
KNIME-based Workflows

- Collecting building blocks, reagents
- Library enumeration
- Substructure filtering
- Diversity filtering
- Stereochemistry filtering
- Phys chem property filtering
- Cost optimization
- Library generation
- Reaction generation for the selected products

Diagram of KNIME-based workflows with nodes and connections.
Integration of Tools

Library enumeration – Reactor
Property filtering – Calc. plugins
Substructure filtering – MolSearch
Stereochemistry
Diversity calculations

KNIME / RDKit-Python

KNIME controls the design process
Diversity calculations – custom Python module (to be incorporated in KNIME)
„Chemistry know how“ incorporated into the enumeration

5/11/2017
ChemAxon User Meeting Budapest 2017
Production ELN/LIMS System

- Standardization
- Ordering of reagents
- Purification
- Qualitative analysis
- Delivery and/or storage
- Production of compounds
- Sample / vial / container handling
- NMR assignment
Components and Connection Points

Inventory and logistics: reagents, vials, orders, etc.
LIMS features: analytical requests, automation...
ELN features: procedures, stoichiometry, etc.
Reaction tree handling
Structure searches (duplicate, full fragment, substr.)

Non-chemical data management

JChem + Standardizer

Compound, production, reagent, inventory, analytical measurement data
Typical Lab Software Architecture

ComInnex aspects:
- Instrument data upload automated as much as possible
- Strict project handling
- Visualize the status of a production/container from its creation to delivery/storage
- Two-way integration with the design workflows:
  - New libraries automatically feed target reactions into the ELN
  - Selection of reagents based on previous usage, price, etc.

Summary

Integration of the tools, minimal user intervention should be required

Powerful tools

Guide/control the design/production process

Requirements
Acknowledgements

• Zoltán Várkonyi
• Gábor Pőcze
• András Vikár
• Tibor Nyári
• Zoltán Cseh

• All the developers of the tools listed before
Thank you for your attention!