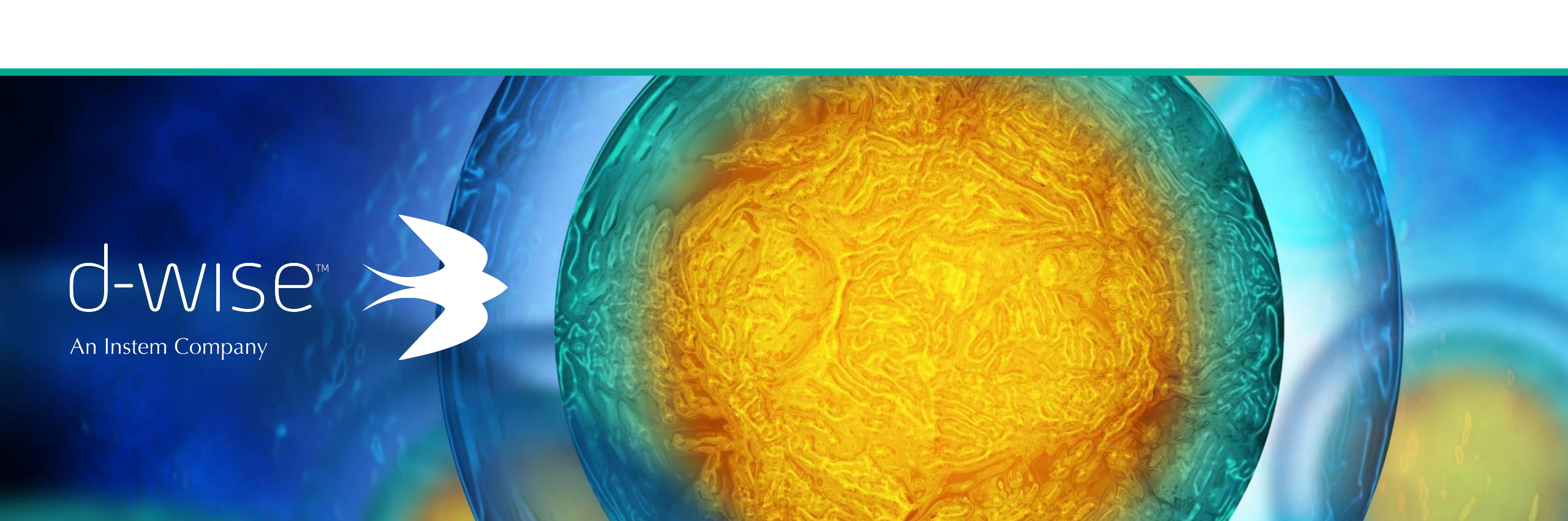




d-wise™

An Instem Company



Transformation from Prescriptive Clinical Data Analyses to Dynamic Data Driven Analytics through the Adoption of Modularized Cloud Components

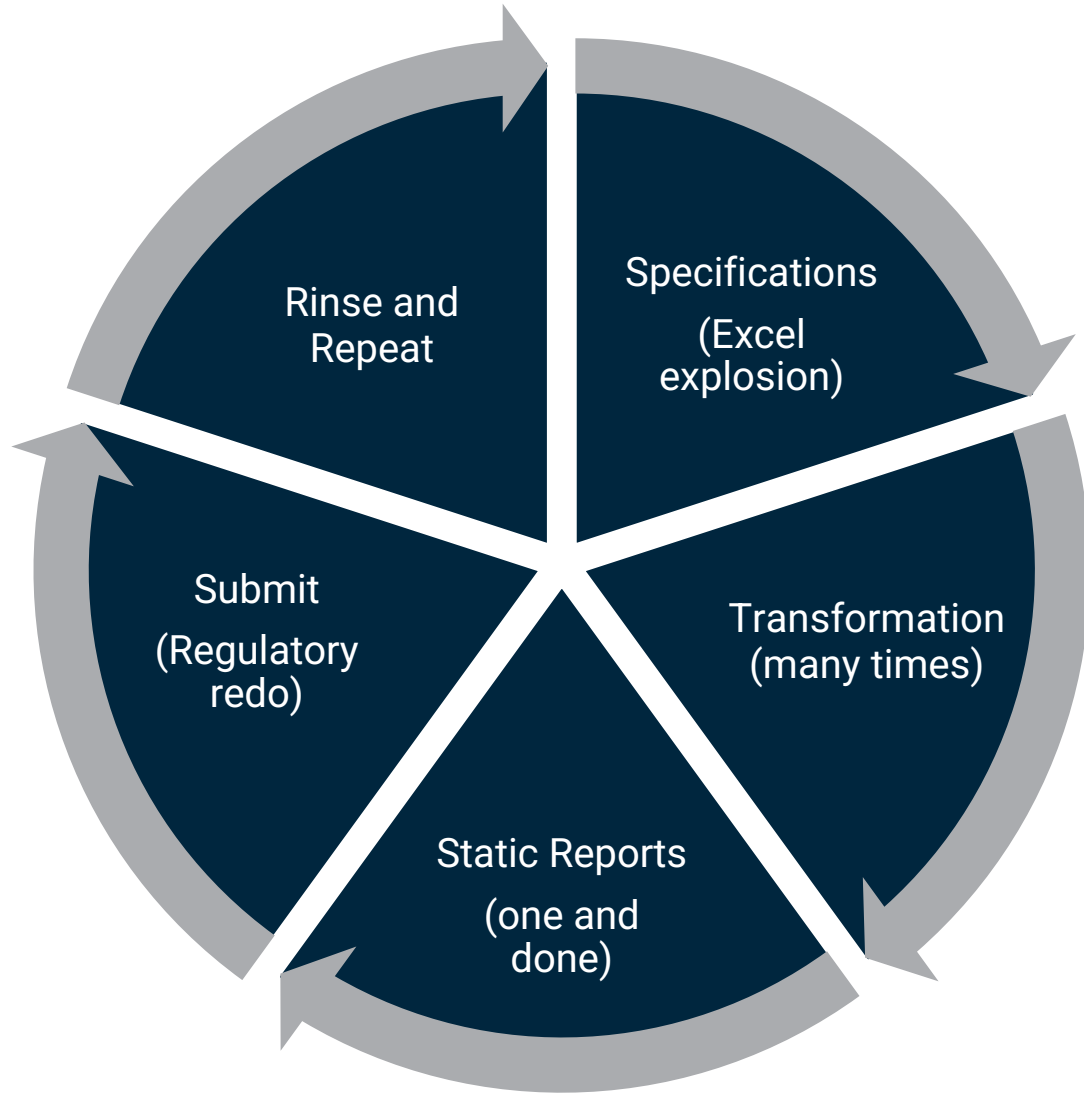
Andy Ratcliffe, Aspire Solution Owner
Chris Decker, Life Sciences Advisor

Agenda

- Today
 - Current Challenges
 - Industry Trends
 - Transition and Transformation to Data Science
- Tomorrow
 - Case Study Outside our Industry
 - Componentry: Why, What and Benefits of Components
 - What could future “SCE” Componentry look like
 - Demonstration of an SCE “Component”

Today

What do we do today?



Today's challenges

- Unintuitive
- Steep learning curve
- Siloed functions

Usability



- Performance
- Validation
- Lack of on demand compute

Scalability



- Rigid process
- Limited access to analytical tools
- Nuanced business needs

Flexibility



- Gaps in access and controls
- Manual and error prone compliance
- Data integrity risks

Compliability



- Lack of robust end to end lineage
- Challenges reproducing results

Traceability





What can cloud-native SCE mean for my business?

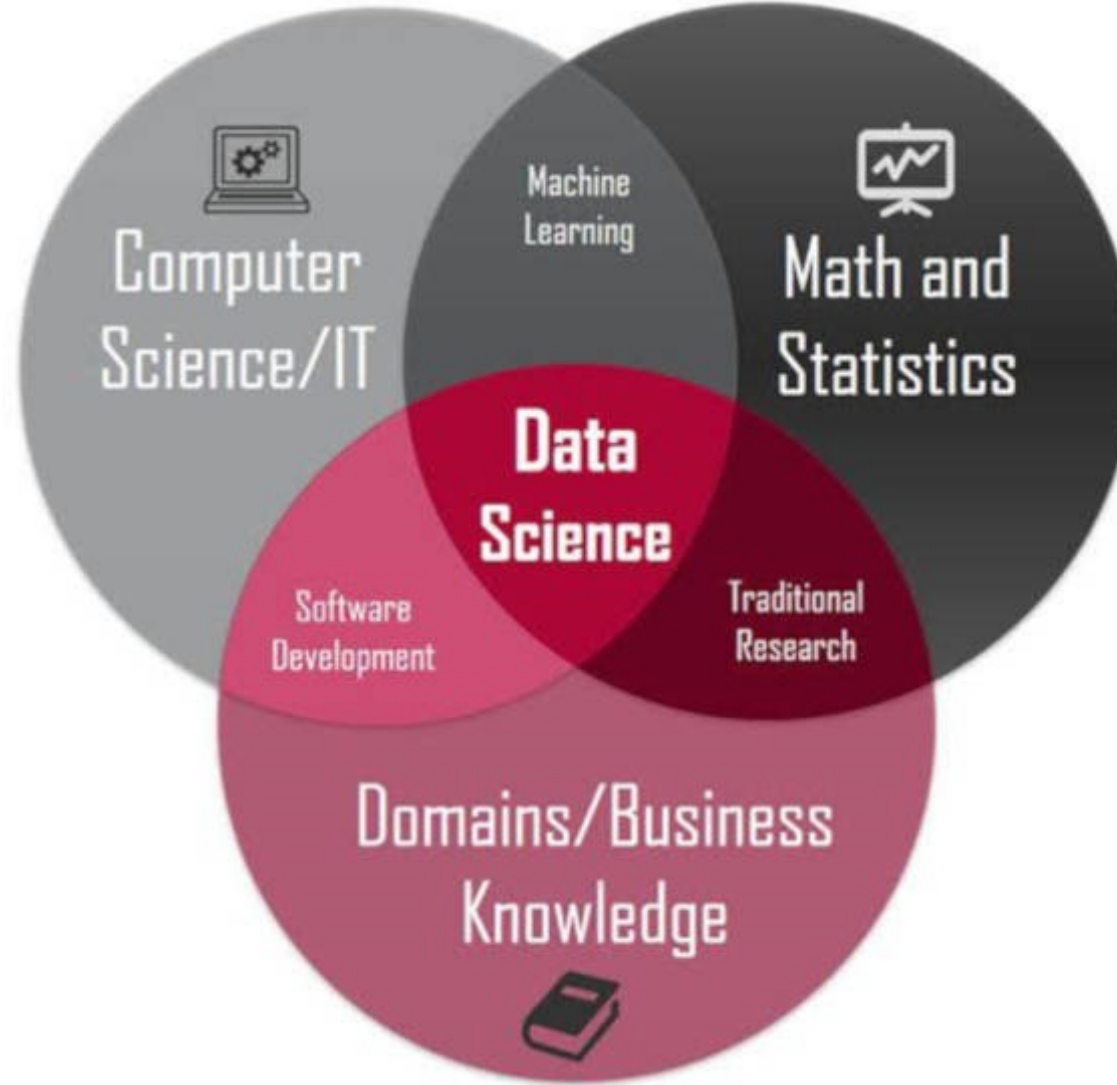


An SCE meeting these principles would deliver **quality, improve decision making and accelerate time to the approval and delivery of new medicines to patients across the globe.**

- ✓ Be an application that is intuitive and easy to use application
- ✓ Involve modern and scalable forward focused technology
- ✓ Adopt technology that is reliably used for big data
- ✓ Facilitate multiple programming languages
- ✓ Effectively integrate with a variety of systems and tools to allow seamless access to data
- ✓ Successfully manage programming workflow e.g. version control, traceability, reproducibility
- ✓ Allow effective outsourcing and collaboration
- ✓ Include automated functionality to replace repetitive and manual-heavy tasks
- ✓ Enable high performance computing for complex statistical methods to be run in minutes

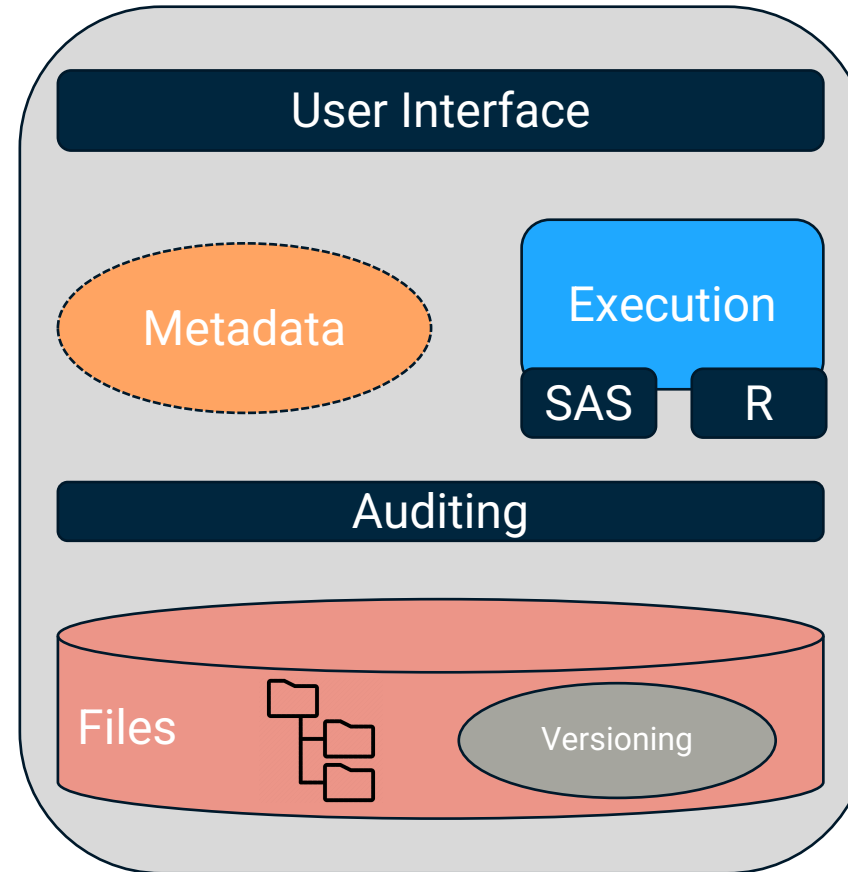
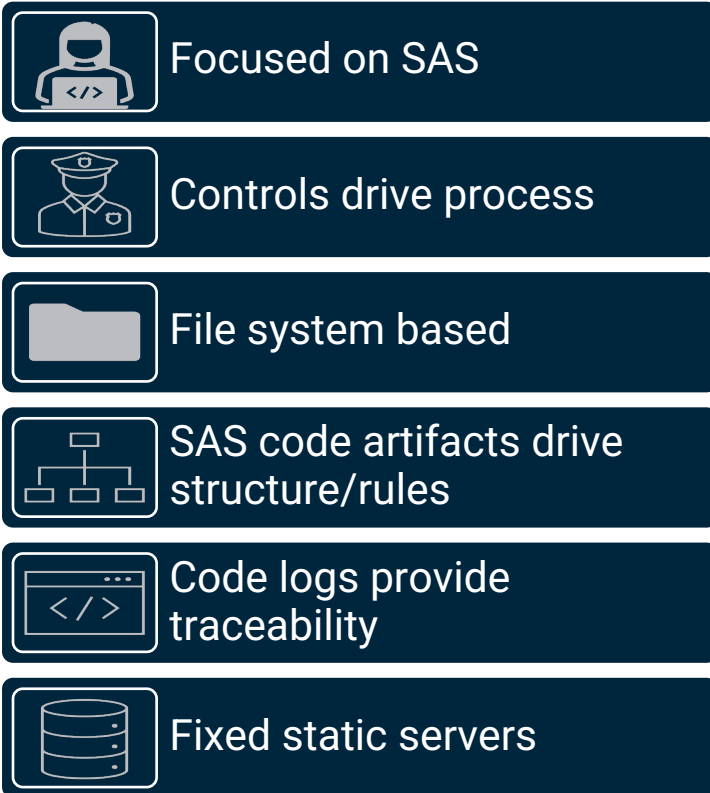


What is a Data Science Platform?



Current State Architecture

Paradigm



Challenges

- Unable to leverage next generation skillsets
- Controls trump user experience
- 1990's file system handcuffs innovation
- Limited code and data structures impedes traceability
- Static server requirements limits scalability and flexibility

Data Science Platforms

Capabilities

- Large data stored in non-traditional data 'lakes' and alternate structures like Linked Graph
- Ingestion of wide range of input data sources/types (Avro, Parquet, CSV, Unstructured)
- Leverage many tools or languages (e.g. Python, R, Julia...)
- Controls less important than access to analytics
- Utilize large data sources for AI/ML training

Enablement

- ✓ Flexible access to wide range of data
- ✓ Dynamic and scalable analyses
- ✓ Use tool or language of choice
- ✓ Burstable scalability
- ✓ AI and ML tools integrated into the process
- ✓ Controls are seamless and don't get in the way

Case Studies: Sponsors are Dabbling

Enabling R Development Pipeline

Business Need:

- Flexible environment focused on collaboration
- Fast, scalable deployment with reproducibility over time

Solution:

- ✓ Containerized R with packages needed for your work
- ✓ CI/CD process to enable development & support workflow

Value:

- Plug-n-Play tools/languages of choice
- Robust and rapid deployment of new capabilities enabling quicker decision making

SCE to the “Cloud”

Business Need:

- Homegrown and legacy tech increasing risk to portfolio
- Push to consolidate on a scalable cloud infrastructure

Solution:

- ✓ Containerized and integrated programming languages
- ✓ UX designed and business rule driven dev → prod workflow

Value:

- Cloud enabled capabilities balanced with get the work done
- Intuitive SCE capabilities users enjoyed working with

Building an Endpoint Library

Business Need:

- Decades of study information buried in documents
- Extracting and populating a library of previous endpoints to inform future design

Solution:

- ✓ NLP combined with ML to identify and catalog endpoints
- ✓ Elastic search to find past studies and leverage for new study design

Value:

- Significantly reduce ‘reinventing the wheel’
- Find past analyses to rapidly enable cross study analytics

Tomorrow

What, Why, and Benefits of “Components”

WHAT

Encapsulated Core
Capability

Flexible &
Configurable

Open Design

WHY

Plug-n-play for your
unique needs

Seamless
Integration

Enhance individually
Reduce testing

BENEFITS

Accelerated delivery

Configured to meet
your business model

Consistent user
experience

Case Studies Outside our Industry



Our mission is to help unleash the potential of every team



Your Life's Work, Powered By Our Life's Work

Unique and powerful suite of software to run your entire business, brought to you by a company with the long term vision to transform the way you work.

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Project and issue tracking
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Business team collaboration
- Jira Service Management**
High-velocity ITSM
- Opsgenie**
Modern incident response
- Statuspage**
Incident communication
- Jira Align**
Enterprise agile planning

COLLABORATE

- Confluence**
Document collaboration
- Trello**
Collaborate visually on any project
- Bitbucket**
Git code management
- Sourcetree**
Git and Mercurial desktop client
- Bamboo**
Integration and release management

SECURITY & IDENTITY

- Atlassian Access**
Security and control for cloud
- Crowd**
User management for self-managed environments

CODE, BUILD, & SHIP

Sales & Marketing

Give your sales team the perfect set of apps to help close more business deals in less time.



CRM



BIGIN



CAMPAIGNS



FORMS



SIGN



SOCIAL



SALESIQ



SURVEY



SITES



PAGESENSE



BACKSTAGE



COMMERCE



BOOKINGS



MARKETING AUTOMATION

Customer Service

Give your service team the right tools and context necessary to make every customer successful.



DESK



ASSIST



LENS

Finance

Solve business accounting challenges using our perfect set of finance apps on the cloud.



BOOKS



INVENTORY

Email & Collaboration

Empower your workforce with apps to collaborate and transform the way they work.



MAIL



MEETING



CLIQ



VOICE



WORKDRIVE



DOCS



WRITER



SHEET



SHOW



PROJECTS



SPRINTS



BUGTRACKER



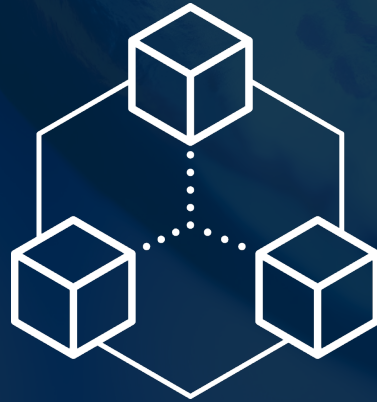
CONNECT



VAULT

A future 'SCE' is...

a **clinical analytics open platform** of **flexible** and **configurable** clinical components allowing data scientists to focus on the **meaning** of the data by **automating** the mundane tasks, providing a fit for purpose **experience** workflow and enabling the **right tool** for the right task built on an **extendable** cloud architecture to rapidly add **new capabilities** while maintaining **data integrity** and **traceability** throughout the clinical data lifecycle



What would clinical analytics components be...

Compute

Language of your choice and seamless scalability you need

Trace

Automated traceability linking inputs, code, and outputs

Audit

Who, what, when...ensuring end to end tracking of information

Lifecycle

Flexible and business rule driven programming lifecycle

Recommend

AI/ML driven digital specification recommendations automating downstream work

Milestone

One click archive and restore of key milestones ensuring reproducibility

What would you add?

Containerized Compute: Component Demonstration



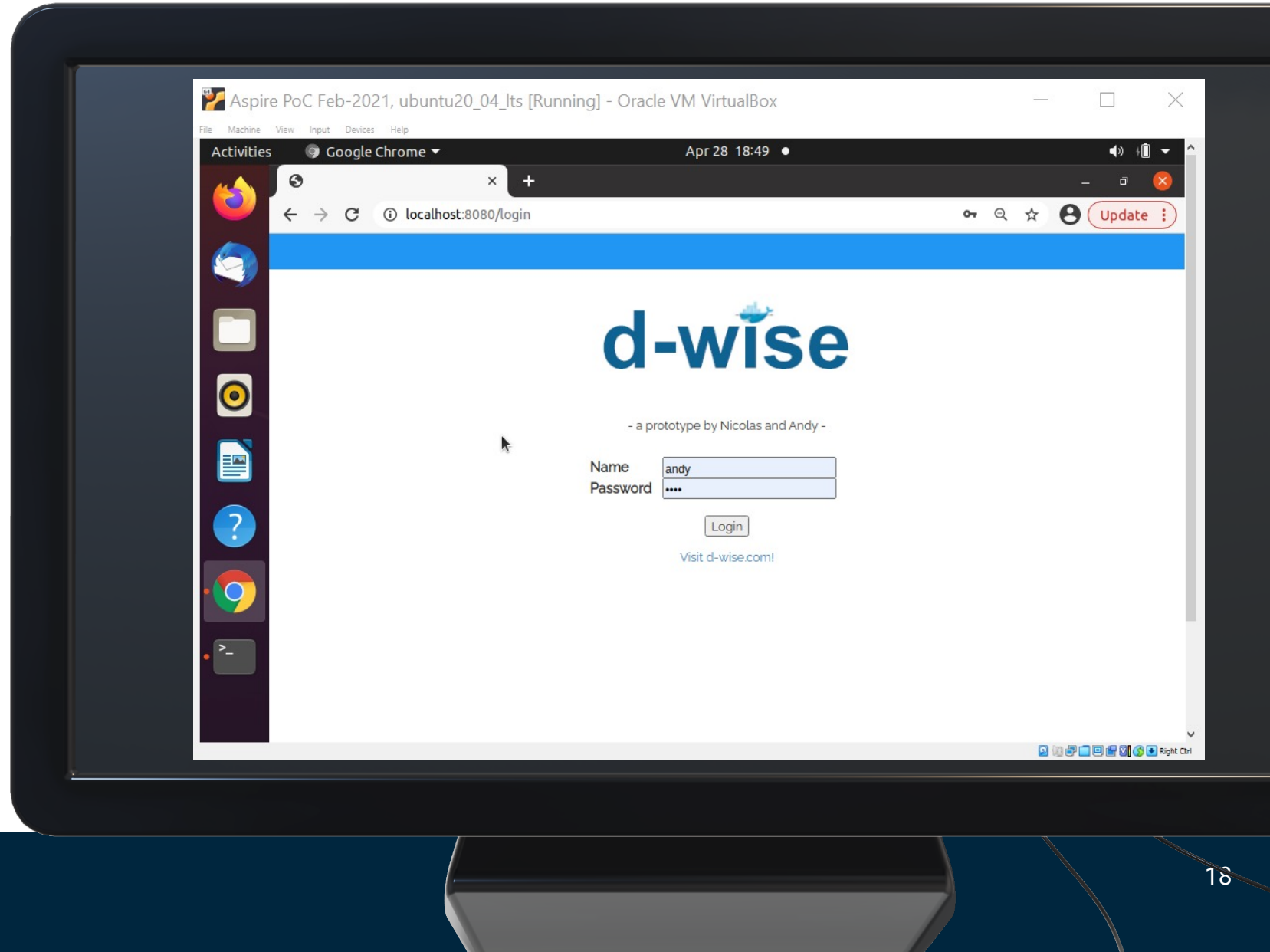
Proof of Concept



- Exploit cloud capabilities
- Create a platform with
 - Consistent user experience
 - Interchangeable components
- “Future Proof”
 - Today’s working methods
 - Tomorrow’s working methods
 - Increased efficiency and quality
 - Facilitated by technology advances
- Broad range of uses
 - Regulatory submission
 - Exploratory, Discovery, Optimisation
- Written in Python
- No user experience (UX) skills were deployed!
- Proof of technology
- Proof of capability
- Proof of benefit and value

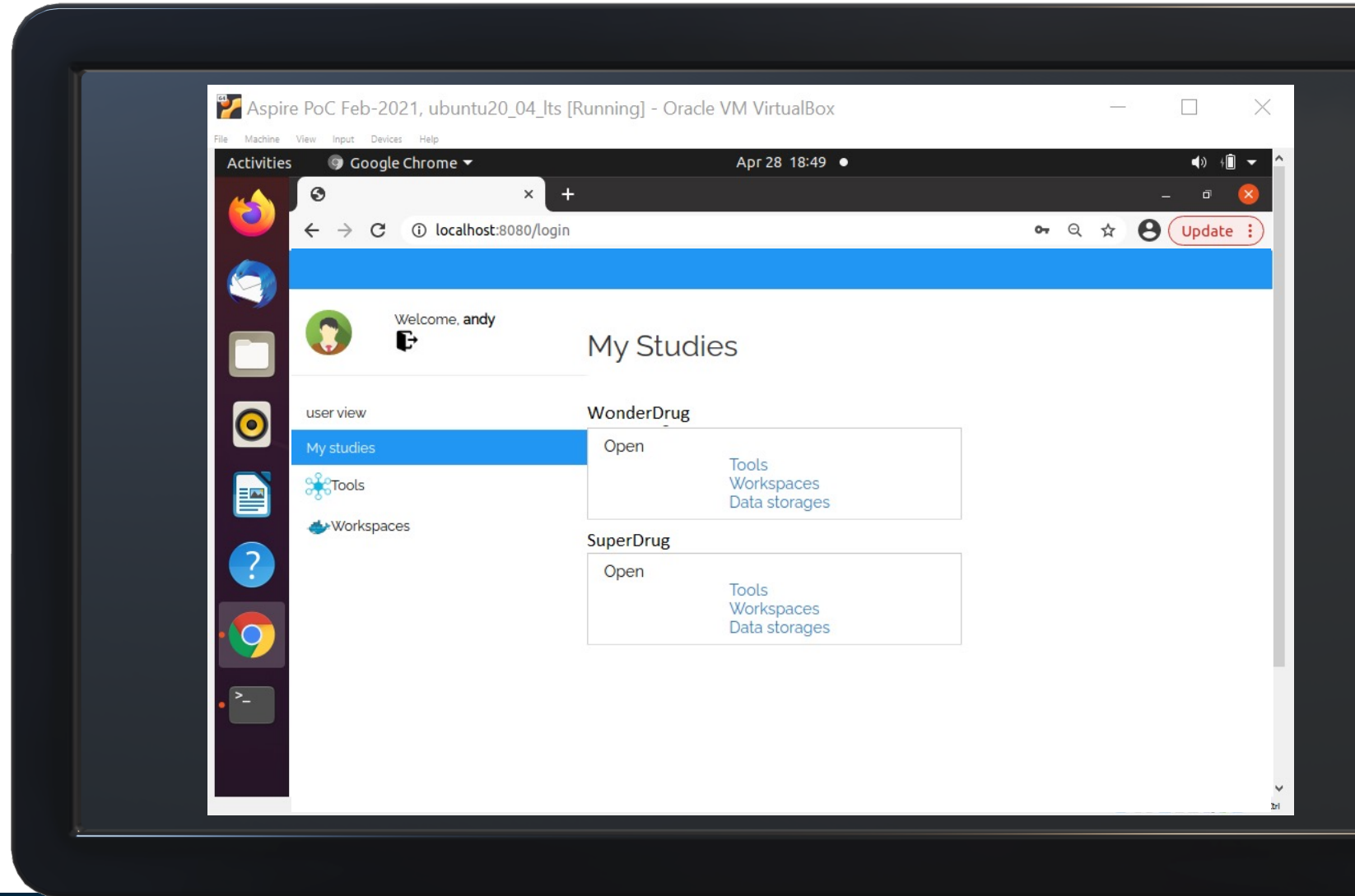
Login as a Statistical Programmer

- Web-based
- Simple deployment
- Simple upgrades
- Low demand on PC specification
- Data need not leave the data centre



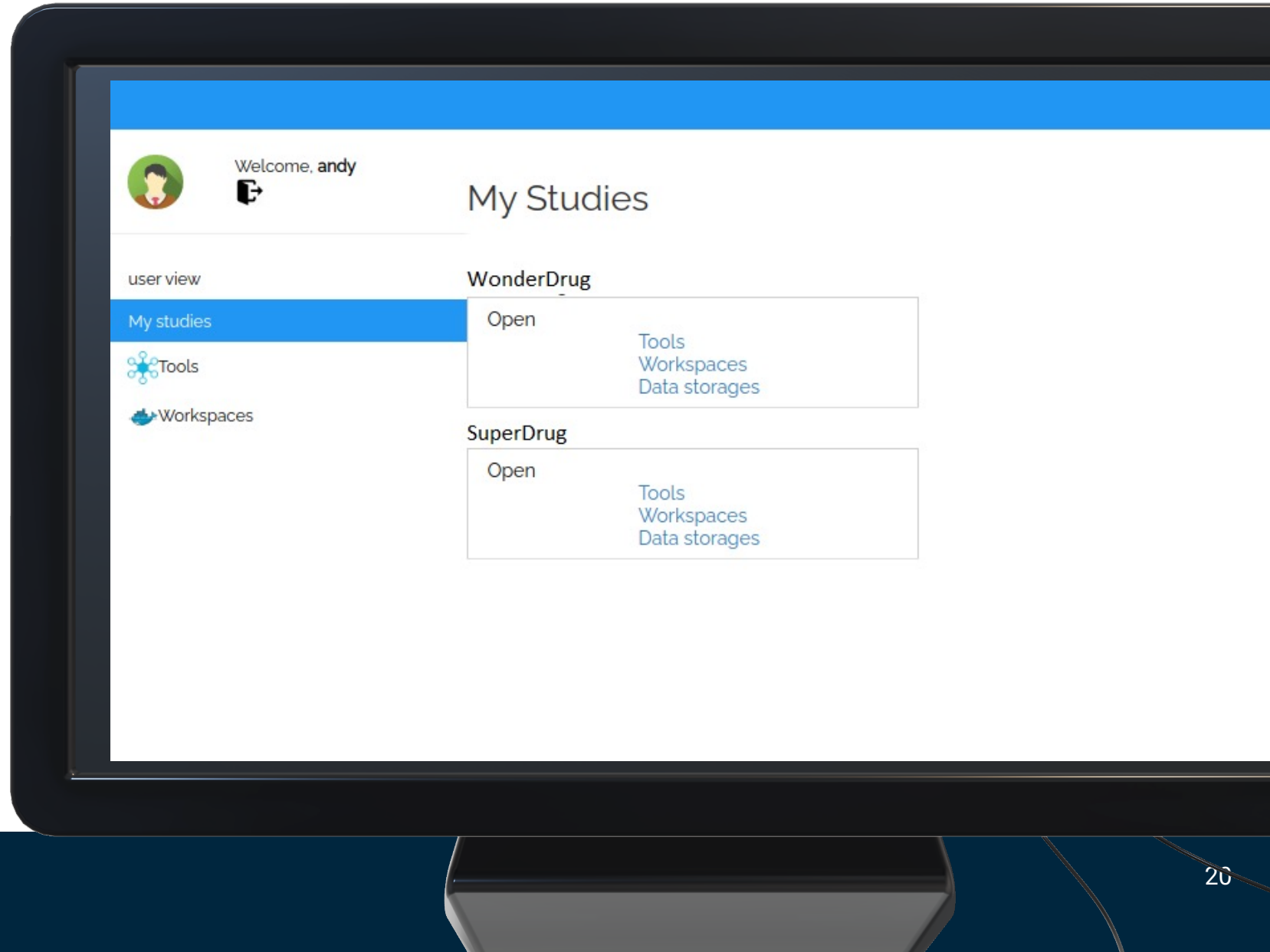
My Work

- User-centric
- Project-centric
- Visibly, projects are a combination of
 - Data files
 - Analytical tools



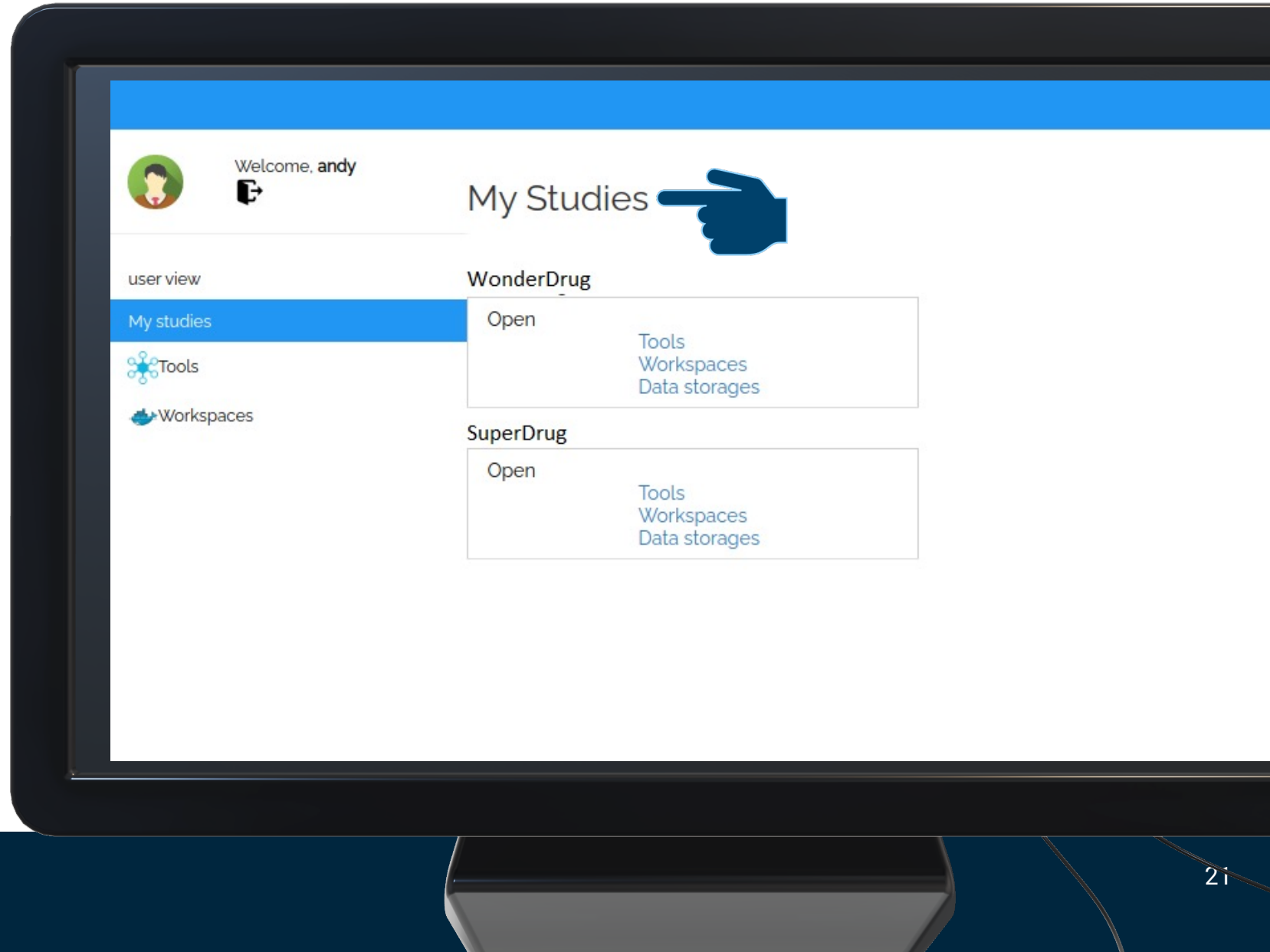
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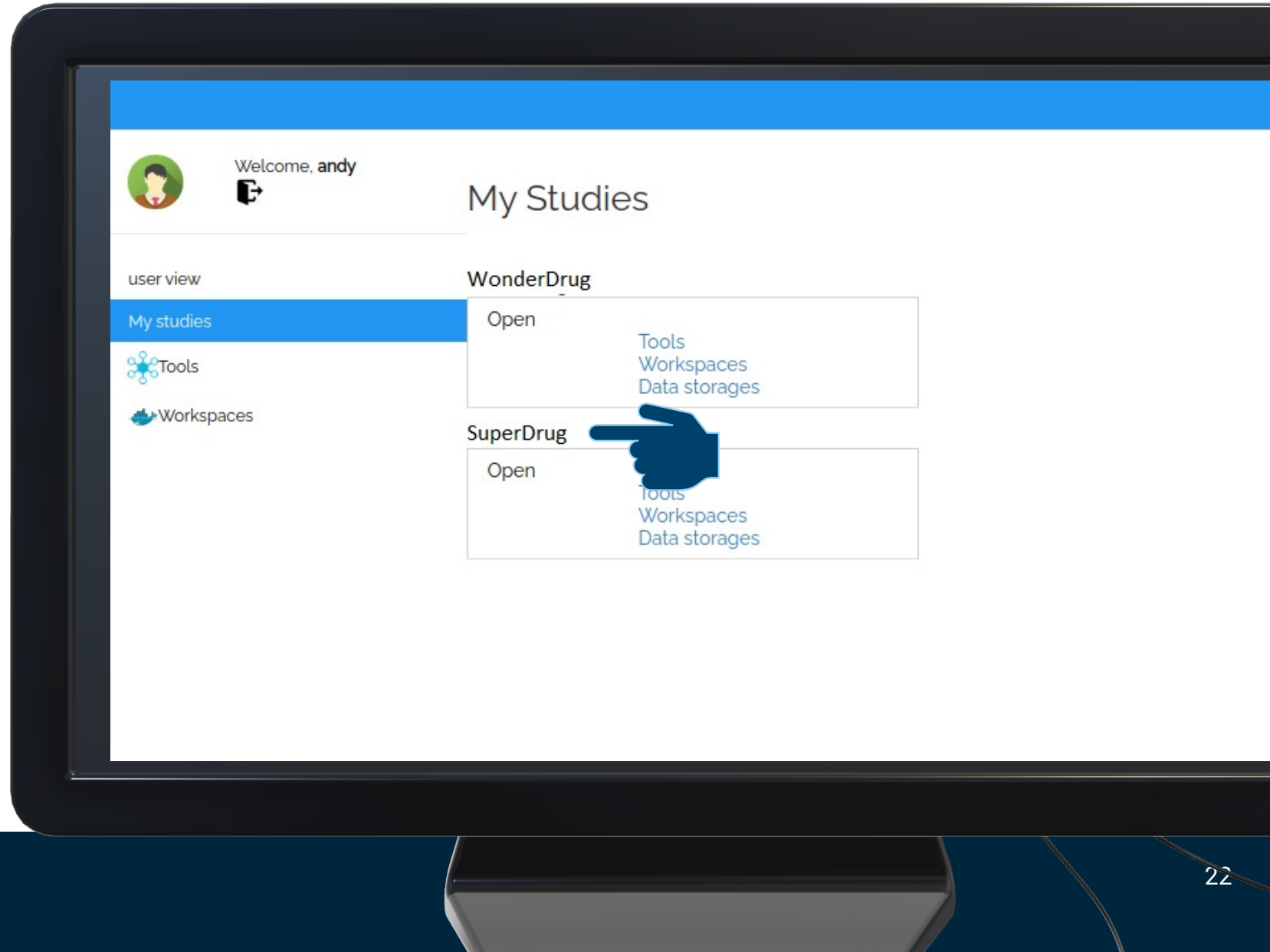
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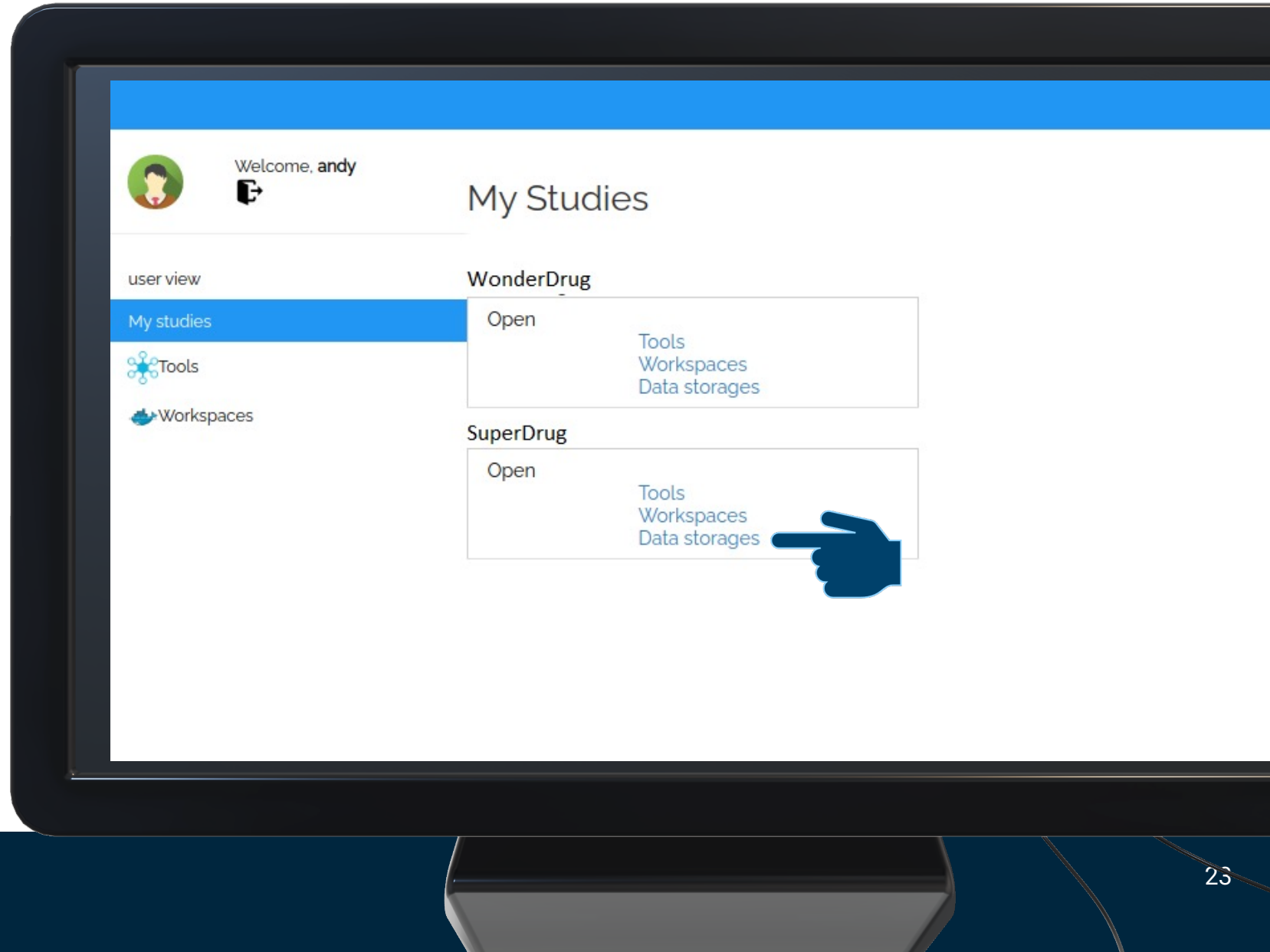
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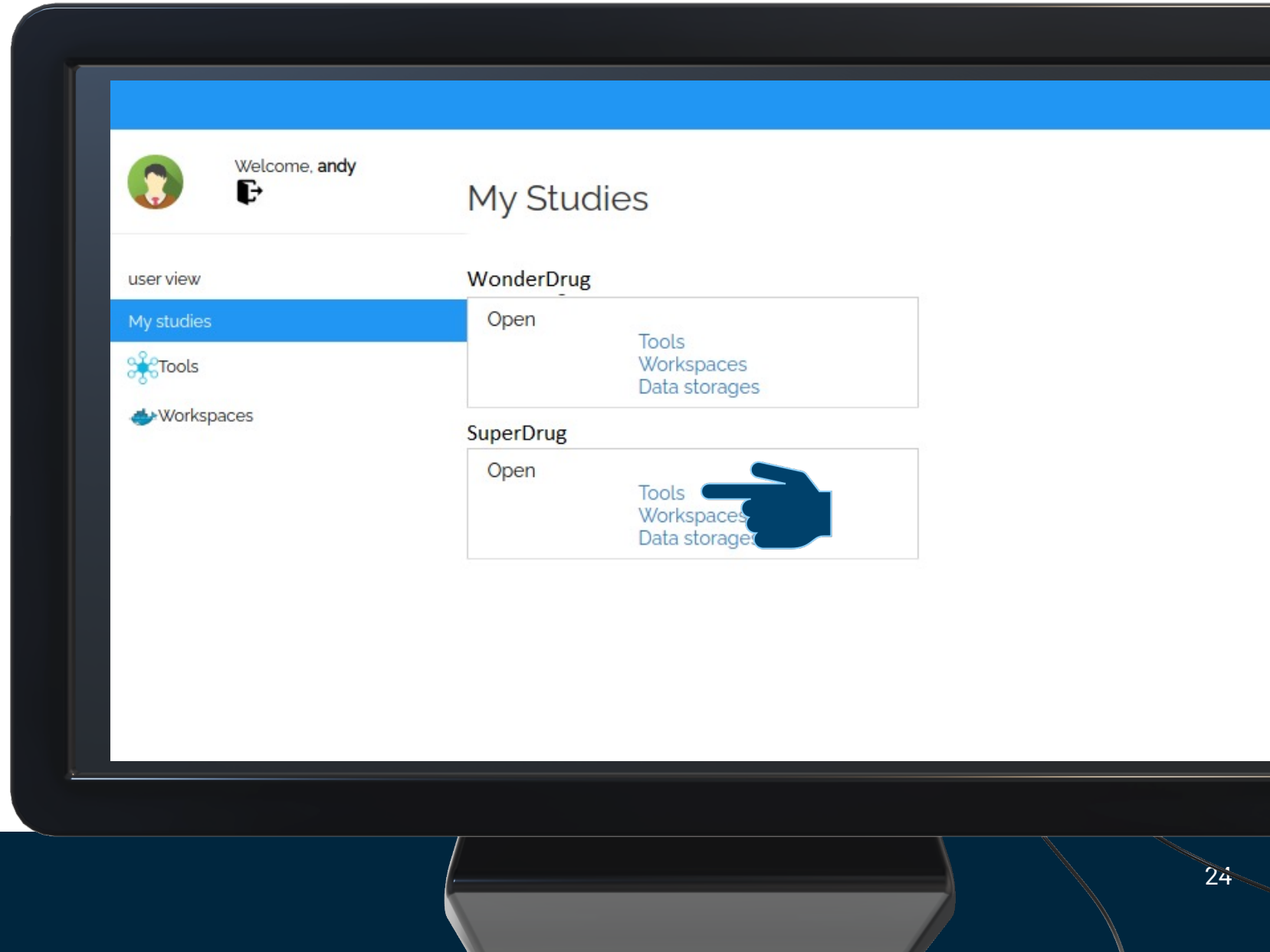
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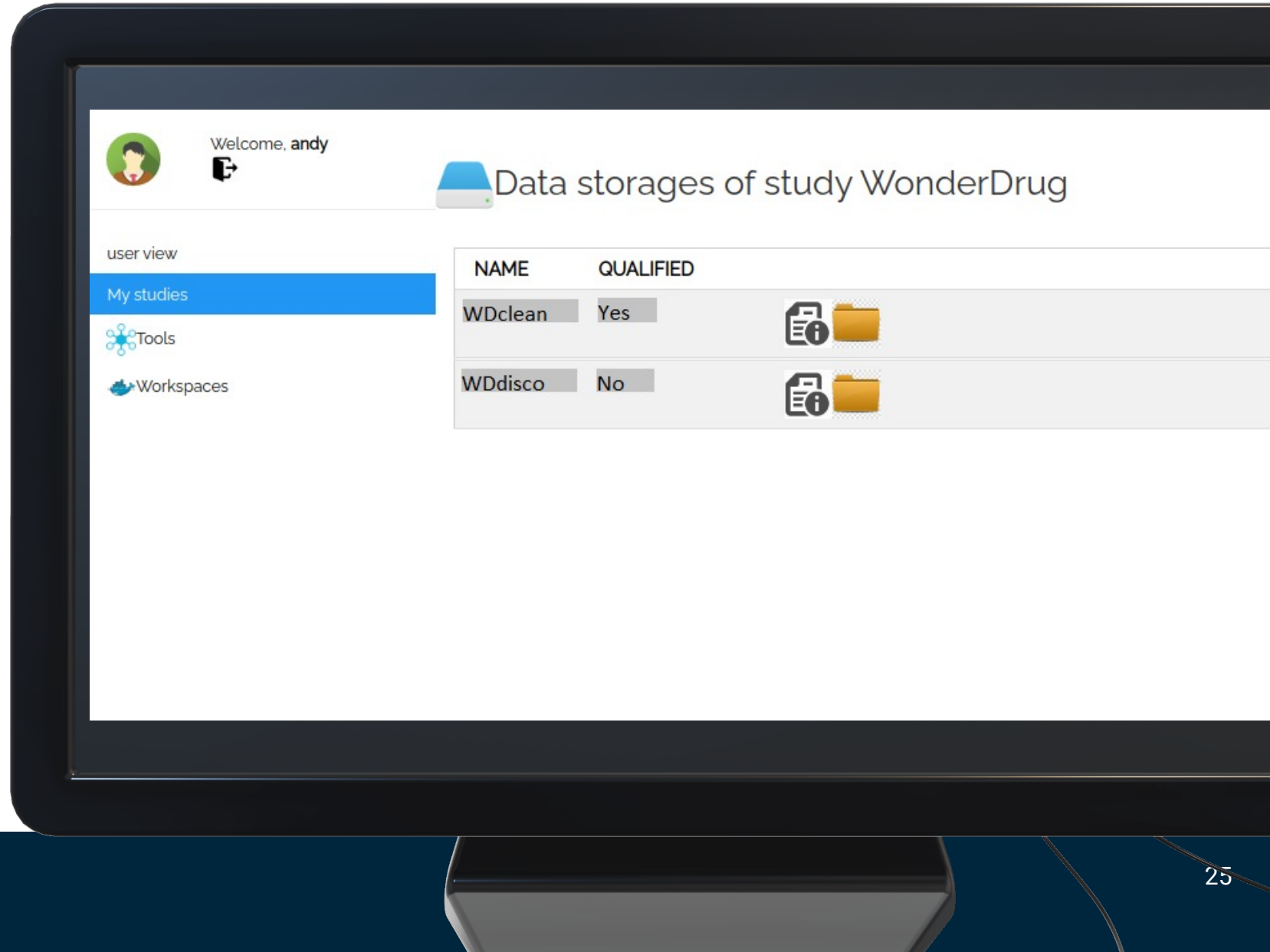
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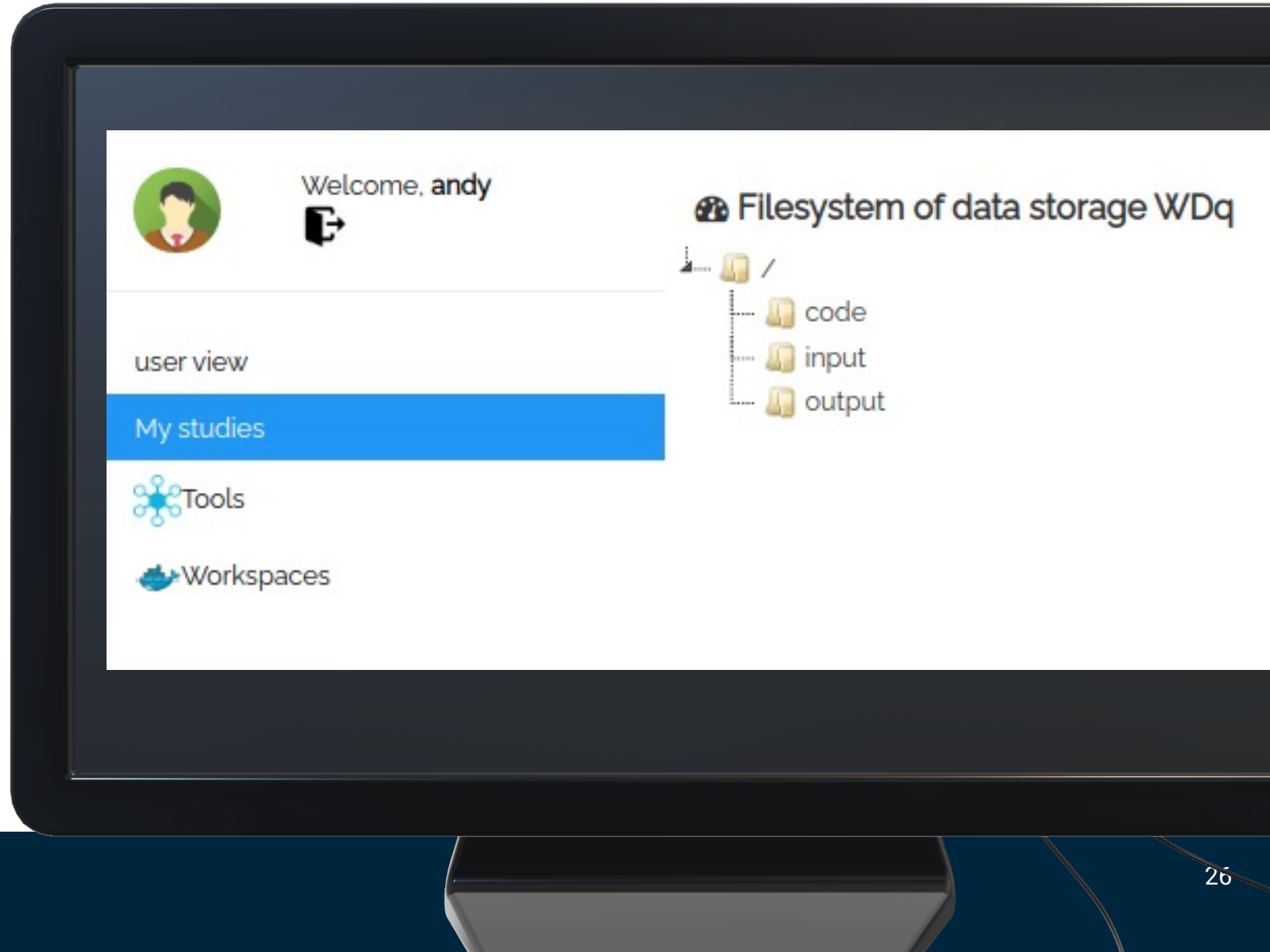
My Project's Data Storage

- Differentiated areas
- Rules to prevent cross-pollination
- Modular storage
 - Per project
 - Per study



My Project's Data Files

- Explore
- View
- Launch



Modular Storage

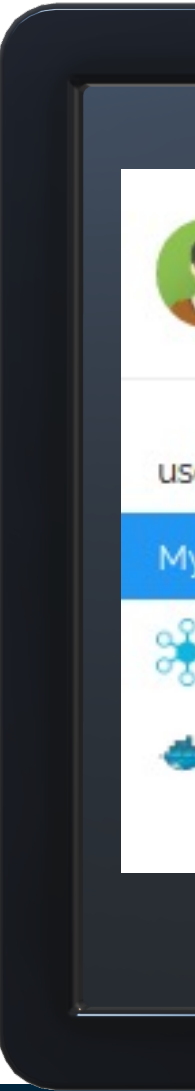
Transition from:

- Monolithic, fast, expensive storage devices

to

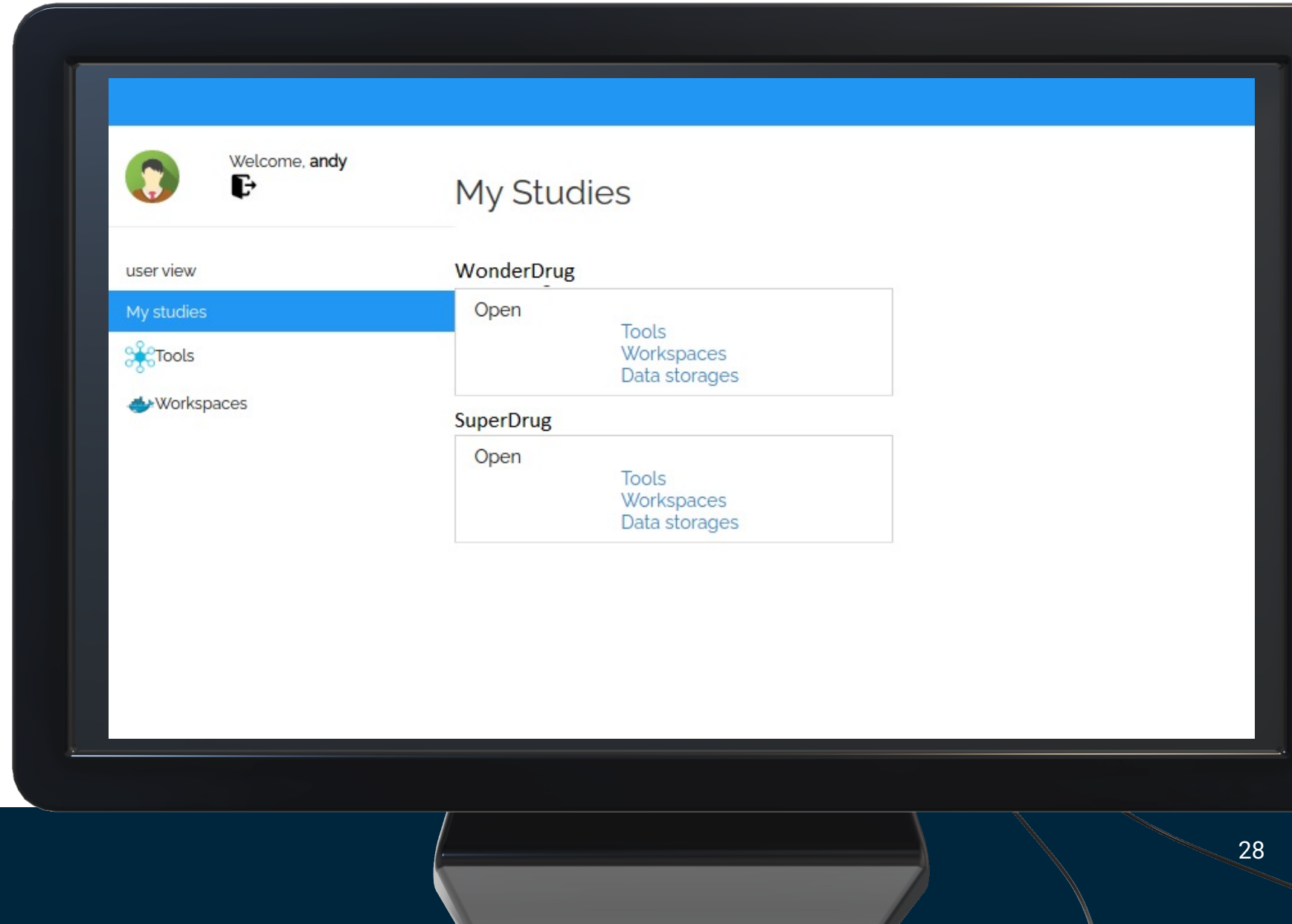
- Modular, independent units
- Less users per device
 - Lower performance demands
 - Lower cost

- Replicate individual units geographically
- Archive individual units
- Adopt new technology in a granular fashion



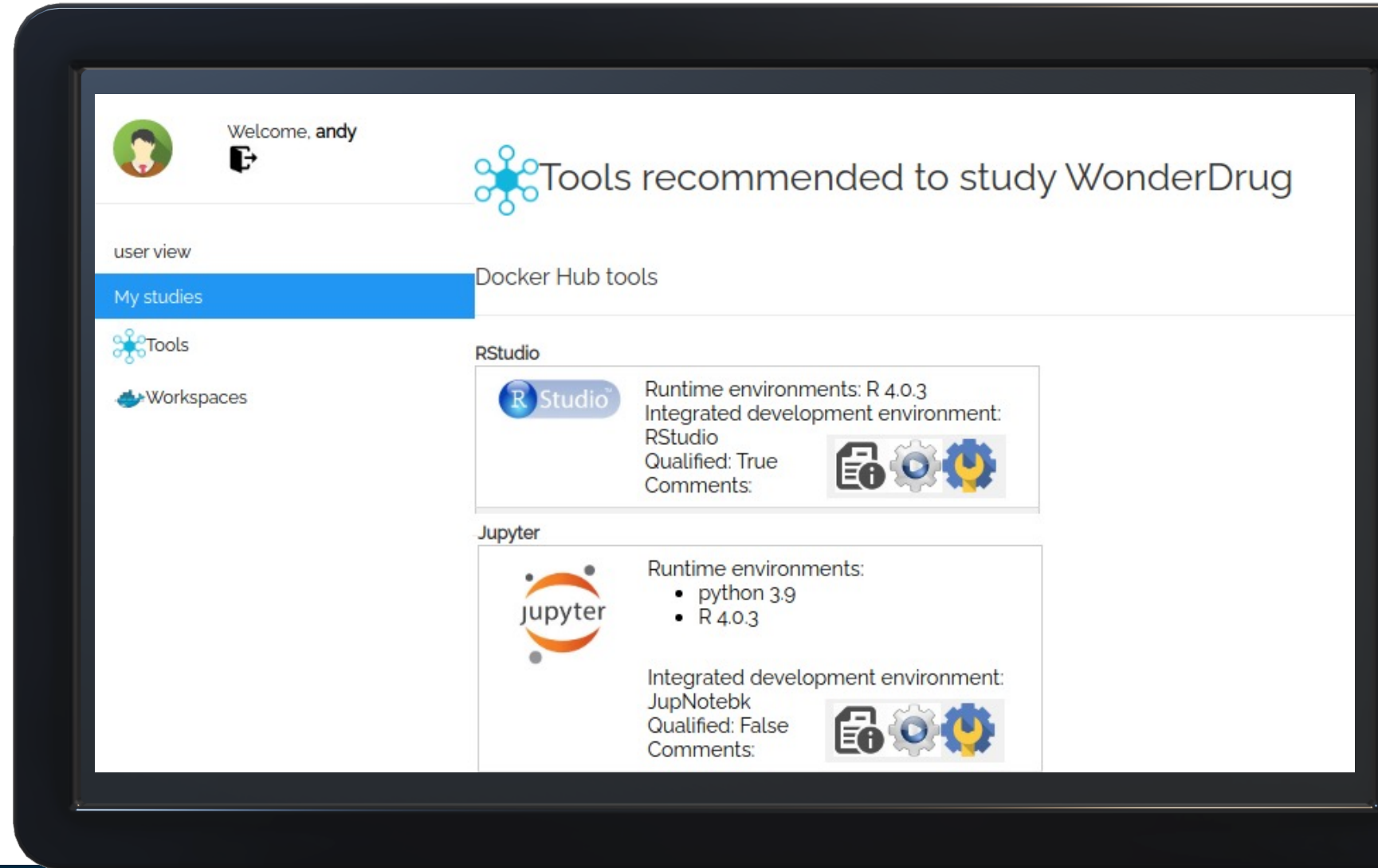
Modular Compute

- Language agnostic
 - All languages and tools are 1st class citizens
 - Languages and versions co-exist
- Recall any language/version at any time, to replicate legacy work



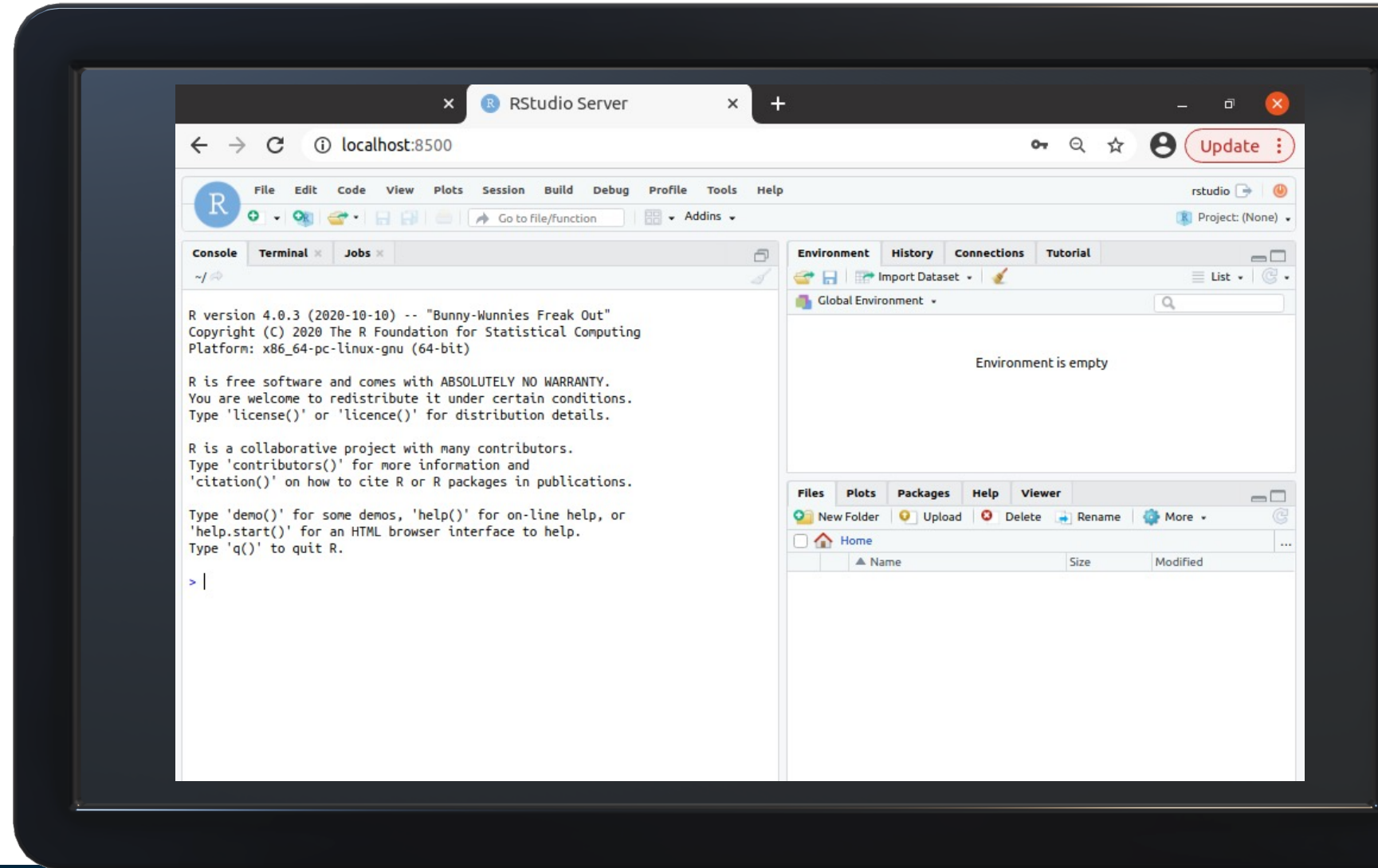
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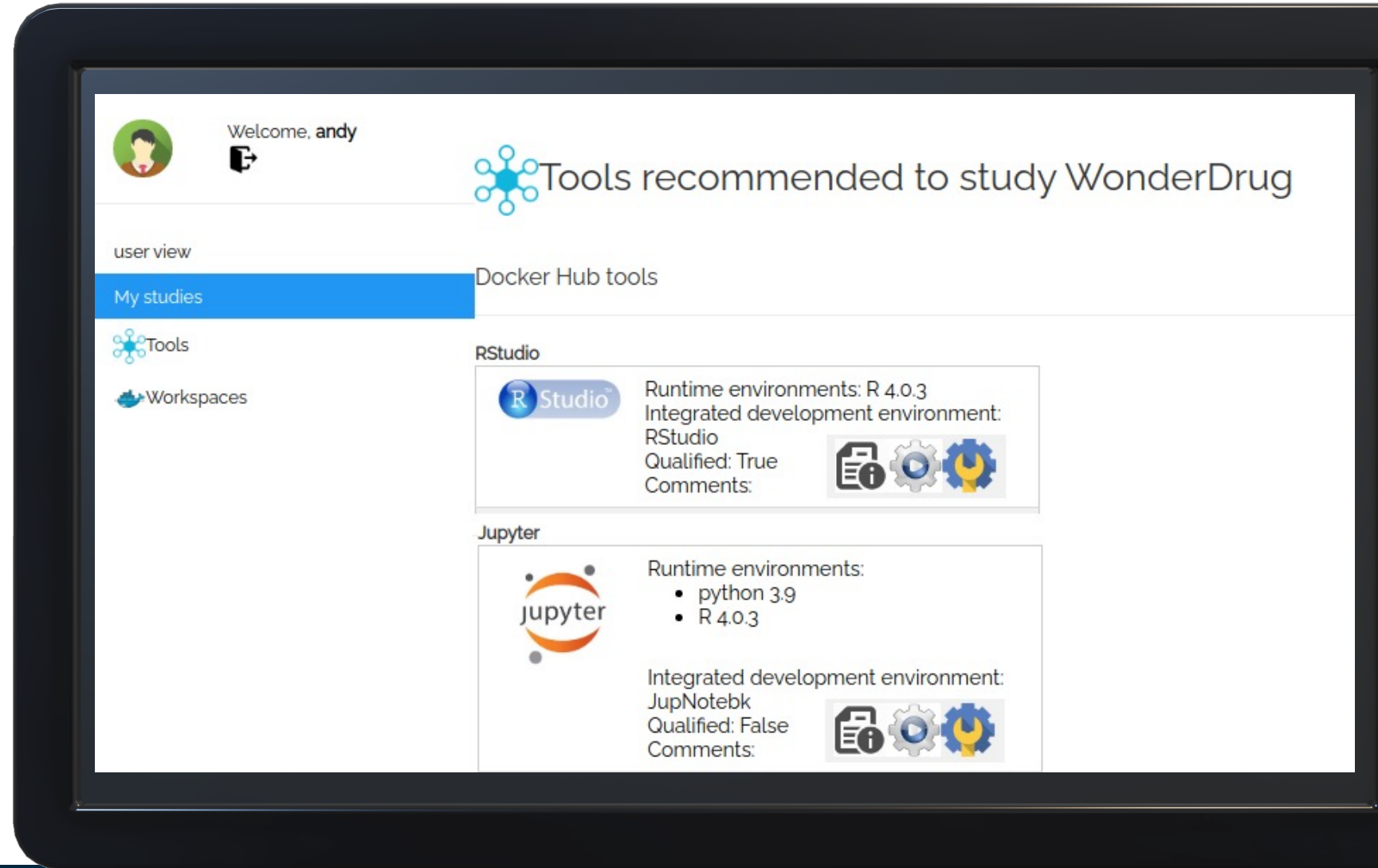
Modular Compute

- Use language-specific Integrated Development Environments (IDEs)
- Use common industry editors and notebooks



Modular Compute

- Each individual workspace consists of
 - Selected tool(s)
 - Project-specific storage
 - User-specific access
- Created & curated by the site administrators



Modular Compute

Each individual workspace consists of

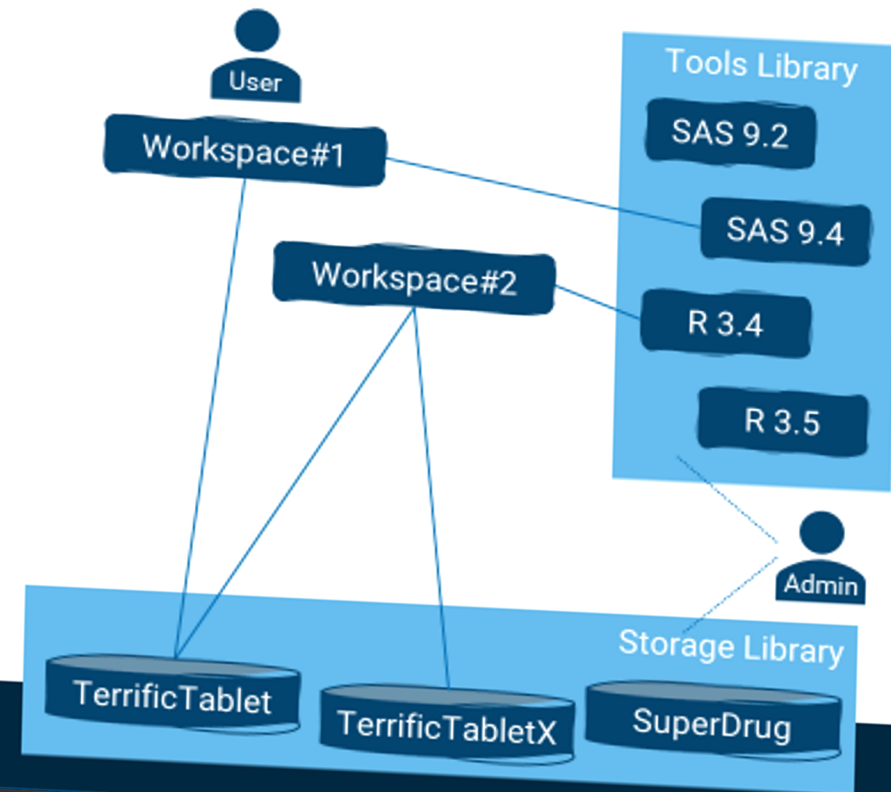
Selected tool(s)

Project-specific storage

User-specific access

Concepts

- **Tools:** analytical languages
 - And associated IDEs, e.g. SAS Studio
- **Data storage:** location where study-specific artefacts are stored
 - e.g. input data, code, output data and TLFs
 - Multiple data storage areas
 - Specific to studies, or shared
 - Flagged, if appropriate, as containing qualified content
- A **workspace** is an ephemeral combination of language/IDE plus data storage area(s)
 - "Personal server"



Modular Compute

Each individual workspace consists of

Selected tool(s)

Project-specific storage

User-specific access

Library of Tools:

SAS 9.4 w/SAS Studio

R w/RStudio

Python w/Jupyter

Viya 4 w/SAS Studio

Modularity allows choice of compute providers & appliances

Core analytics

Viya 4 w/CAS, Jobs, etc

Domino DataLabs

Metrum Metworx

Components for the Win!

WHAT

Encapsulated Core
Capability

Flexible &
Configurable

Open Design

WHY

Plug-n-play for your
unique needs

Seamless
Integration

Enhance individually
Reduce testing

BENEFITS

Accelerated delivery

Configured to meet
your business model

Consistent user
experience

Q&A

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