

# SOLUTIONS FOR COLLABORATIVE NETWORKED RESEARCH

Dotmatics provides a comprehensive web-based collaboration platform that enables research partners across organisations, disciplines and geographies to share and access project data in real-time, monitor progress and make informed decisions.

## NETWORKED RESEARCH: NEW PARADIGM

In a shift from the long established business model, life sciences research is now often carried out in collaborative networks that include pharma companies, biotech, CROs, academia and research institutes working together on a single research project and jointly developing intellectual property<sup>1</sup>. An estimated 30-50% of all spending on discovery projects is now spent outside the sponsoring organisation<sup>2</sup> and up to 60% of all innovation in top pharma companies may be derived from external sources<sup>3</sup>. At the same time many of these projects are failing for a variety of reasons including poor communication and data/reporting inconsistencies.

Today, data exchange, collaboration and communication within an externalised project is often facilitated by email and/or secure document exchange (e.g. via SharePoint). This is time consuming, requires error prone manual data manipulation, is not scientifically aware and makes the management of IP within the project extremely difficult. Alternatively sponsor companies provide VPN access to their internal systems to partners, potentially exposing security risks and requiring significant extra control and monitoring.

Dotmatics provides an integrated informatics solution to address the needs of collaborative networked research teams. This supports the workflow of these teams with the exchange of project data in real-time, enabling them to operate at maximum efficiency and provides significant advantages over the use of SharePoint or VPN-access type solutions.

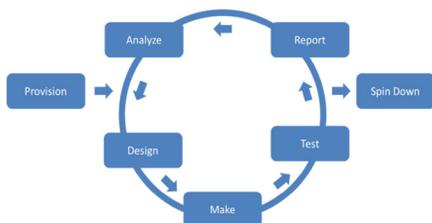
## HOSTED COLLABORATION SYSTEM

The Dotmatics Platform can be hosted securely in the Amazon cloud and therefore accessed by all parties in the collaboration outside of their firewalls. This minimises the security risks and any administrative overheads involved in granting VPN access and allows partners to be spun up and down quickly.

## SCIENTIFIC DATA EXCHANGE

The Dotmatics Platform provides a scientifically-aware shared data repository designed for scientific research data that understands chemical structures, sequences, assay and DMPK data, experiments and scientific images. This means that project teams are always working on live research data. By contrast when facilitating collaborations via files and secure document exchange (e.g. sending spreadsheets or SD files) files must constantly be created distributed and then interpreted. These are time consuming processes prone to manual error. This means that project data is not available in real-time and is likely to become out of sync across partners.

Most discovery projects follow an iterative cycle of design, make, test and analyse as shown:



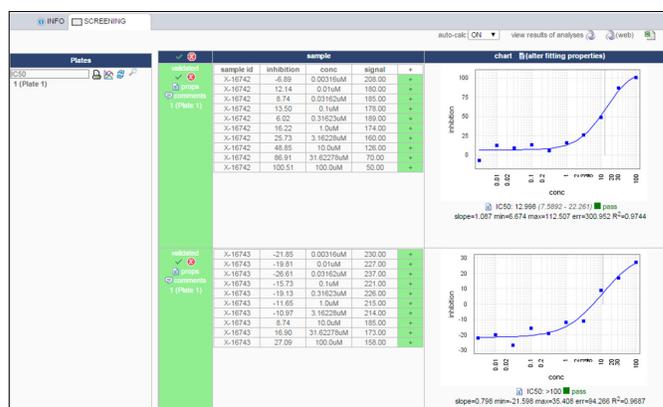
There are additional challenges associated with the inception and conclusion of networked research projects. Projects must be spun up quickly (the provisioning step), enabling scientists from all relevant companies to have access to the project and the initial data appropriate for them. Partners may also join or leave a project as the research progresses so these must be added or removed quickly.

At the end of a project, results and IP must be secured and distributed to the partners according to sometimes complex contractual arrangements.

The Dotmatics collaboration suite provides integrated capabilities that support all of the collaborators at all stages of the discovery cycle including the provisioning and spin-down phases. The scientific data in the suite is live which means that all authorised participants see the outcomes of experiments and analytics in real-time, allowing projects to progress as efficiently as possible. Capabilities of the suite include:

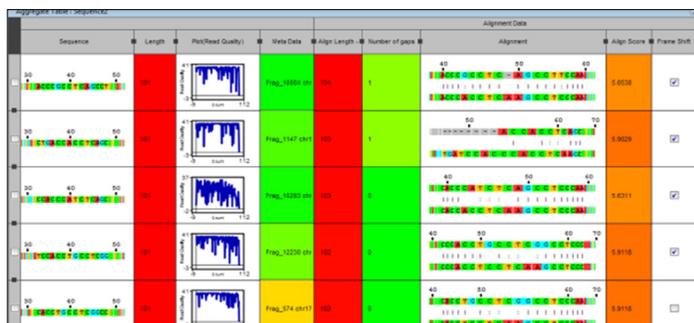
- **ELN** – experiments are collaborative and with appropriate permissions, experiments conducted at one partner can be shared and searched at others. Scientists at one partner can also create an experiment (e.g. a synthetic chemistry plan, or assay protocol) and then another partner can execute that experiment and record the results. Since these are captured in the Electronic Lab Notebook, all IP within the project is tracked, and its ownership and execution can be monitored and audited. Experiment templates can be highly structured, such as the synthesis experiment (shown above/below), or much more free-form, often used in biologics discovery (above/below).

- **Registration** to record new chemical and biological entities, and allow batches and samples to be created in the system. A shared registration process means that these entities are consistently represented irrespective of which partner is creating them, avoiding potential misunderstandings that might arise with different corporate conventions used at each partner. This cloud based registry can optionally be linked to an internal corporate registry to sync compounds during or after the project as contracts allow.
- **Inventory and sample management** allow for the tracking of reagents and samples across all of the partners in the project in a single shared repository. Workflows provide for dispensing as well as the creation and management of storage and assay plates.
- **Assay data management** capabilities allow all types of screening from HTS/HCS to secondary screening and DMPK to be processed and shared across the collaboration. Standard terminology and data processing rules prevent ambiguities or misinterpretations that can arise when results are shared via files prepared by scientists in one organisation using different conventions to those from another organisation later interpreting those files.



- **Work requesting** – the logistics of scheduling work becomes exponentially harder as more organisations become involved. The requesting system allows project leaders to request specific work to be carried out by the partners – for example to request an assay execution at a CRO once compounds have been produced at a different CRO. It allows managers processing requests at CROs to package and schedule works across their teams. It also allows the status of work in progress to be visible to all partner scientists
- **Document Management** – there are many documents that need to be managed and shared across partners to ensure a successful collaboration. The suite's document management system allows scientific documents (project reports, scientific publications, etc.) to be shared across the partners in a searchable form, and can be used to manage the business related documents (contracts, SLAs) if appropriate.
- **Analytics and decision support** – collaborative research is much more than fee-for-service chemistry or biology. Many projects are now joint discovery, with decisions being made by a scientific team

that spans organisations. The Dotmatics suite ensures that the same data analysis and visualisation methods are used across all of the team so that decisions are made based on a common, consistent understanding of the project data and analysis.

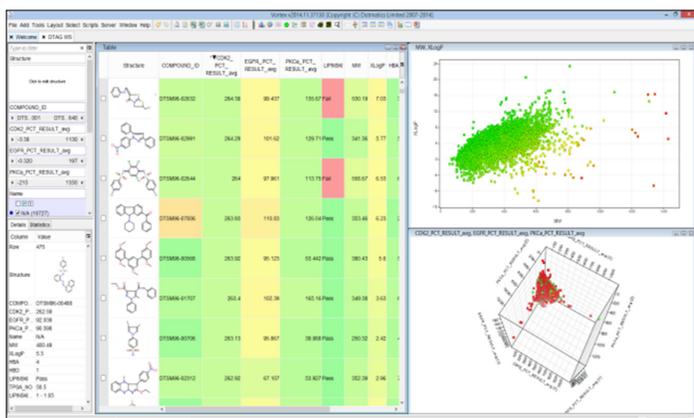


## SOCIAL TEAM COLLABORATION

Networked research requires effective communication across multiple organisations, cultures and/or geographies. The Dotmatics solution provides social collaboration tools that allow all members of the team to continuously communicate around the scientific objects such as compound sets, assay results and experiments within the project.

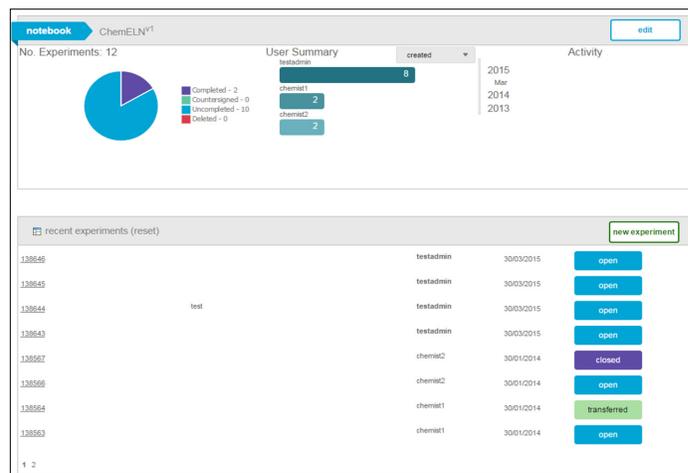
The image shows a screenshot of a project page for 'ALZHEIMERS' on the Dotmatics platform. The page features a navigation bar with tabs like 'home', 'all', 'assay', 'formal', 'published', 'email', 'discussion', and 'competition'. The main content area displays a feed of updates, including 'PUBLISHED' items, 'ASSAY' results, and 'new paper' announcements. A 'dotmatics' logo is also visible in the top right corner.

This augments the periodic structured team communication that usually happens via conference call, WebEx and/or email – it allows all team members to understand the important developments within the project in real-time and enables scientists to provide immediate feedback to each other in relation to such developments.



## PROJECT MANAGEMENT AND KPIs

For team leaders, managing a project and monitoring its progress becomes much harder once external partners are involved. The Dotmatics solution provides a variety of reports, dashboards and KPIs that show the status of projects and monitor the performance of partners.



## SECURITY AND DATA ACCESS

Multi-company collaboration typically brings with it the need for much more fine-grained data access by role than traditional internal systems where the norm has often been that most scientists can access most data. The Dotmatics solution allows this access to be configured so that individual records or even types of data (e.g. molecules, assays) within a record can be restricted to certain partners.

## DATA SYNCHRONIZATION

Most companies mix external and internal research, and already have informatics systems in place to support the latter. It is therefore important that data and experiments can be synchronized between the cloud and internal systems to

- provision data from internal systems at the start of a project
- retrieve results during or at the conclusion of a project

This gives companies the choice of having their internal scientists work within the collaboration portal or work in their internal systems but see the collaboration data alongside internal data. The Dotmatics platform provides RESTful web service APIs and other access methods to allow connections to be set up between the cloud and Dotmatics or 3rd party on-premise systems.

## PROVIDING VALUE TO OUR CUSTOMERS

The Dotmatics solutions are already in widespread use to support collaborative networked research.

**AstraZeneca's**<sup>4</sup> Neuroscience Innovative Medicines Unit (iMed) uses the Dotmatics solution for compound registration and tracking, biological screening and DMPK analysis as well as a fully integrated chemistry and biology ELN and project management. The Neuroscience

*"THE SECURE WEB-BASED DEPLOYMENT OF DOTMATICS' SOFTWARE WILL ALLOW OUR EXTERNAL COLLABORATORS TO EASILY ACCESS THEIR DATA WHILE MAINTAINING SAFEGUARDS AGAINST THE RELEASE OF DATA FROM UNRELATED PROGRAMS."*

*DR MAGID ABOU-GHARBIA, ASSOCIATE DEAN FOR RESEARCH AND DIRECTOR  
THE MOULDER CENTER*

iMed manages a portfolio of drug discovery and development projects exclusively with external partners and their strategy focuses on accessing cutting-edge science and world-class capabilities through partnership and collaboration with academia, industry and contract research organisations. The flexibility of the Dotmatics solution enables AstraZeneca's scientists, collaborators and partners to instantly interact with the same data regardless of location and time zone, fulfilling the promise of real-time research.

**A major US-based biotech company**<sup>5</sup> uses the cloud hosted Dotmatics platform to manage their chemistry outsourcing workflow. Compounds are designed at the biotech, structures and requests for

*"THE DOTMATICS PLATFORM "GIVES US THE ABILITY TO COLLABORATE AND SHARE DATA EASILY, SECURELY AND IN REAL-TIME."*

*DR MARK DUGGAN, VICE PRESIDENT  
NEUROSCIENCE IMED.*

synthesis are transmitted to their CROs in Asia via the ELN, and the CRO updates the status back to the biotech before shipping the synthesised compounds to them. The solution allows the biotech's project leaders to track progress, actively monitor CRO performance and better control changing priorities. It provides the scientists with real-time access to experimental data and facilitates communication across the globe between companies in the form of chemical structures which all scientists prefer.

**CalciCo**<sup>6</sup> is a biotechnology company based in Oxford, United Kingdom, which focuses on the development of novel CRAC channel inhibitors. They have implemented the Dotmatics Platform in the cloud to manage

*"THE CLOUD HOSTING OF THE DOTMATICS PLATFORM MINIMISES OUR IT OVERHEADS AND GIVES US PEACE OF MIND IN RELATION TO DATA INTEGRITY AND SECURITY. THIS IS PARTICULARLY IMPORTANT AS WE WORK IN COLLABORATION WITH MULTIPLE THIRD PARTY ORGANISATIONS."*

*DR FRASER MURRAY, VICE PRESIDENT OF BIOLOGY  
CALCICO*

and analyse their biotherapeutics data which efficiently facilitates the handling of all internal research data as well as their networked collaborative engagements.

The **Moulder Center for Drug Discovery Research**<sup>7</sup> at Temple University has adopted the Dotmatics platform to support their internal research and external collaborations, allowing their scientists to quickly triage, integrate and analyse data from a variety of sources.

4. <http://google/cokd7T>  
5. Dotmatics User Group Meeting 2014 - presentation available on request  
6. <http://google/QZuGQs>  
7. <http://google/ewLmkH>

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