

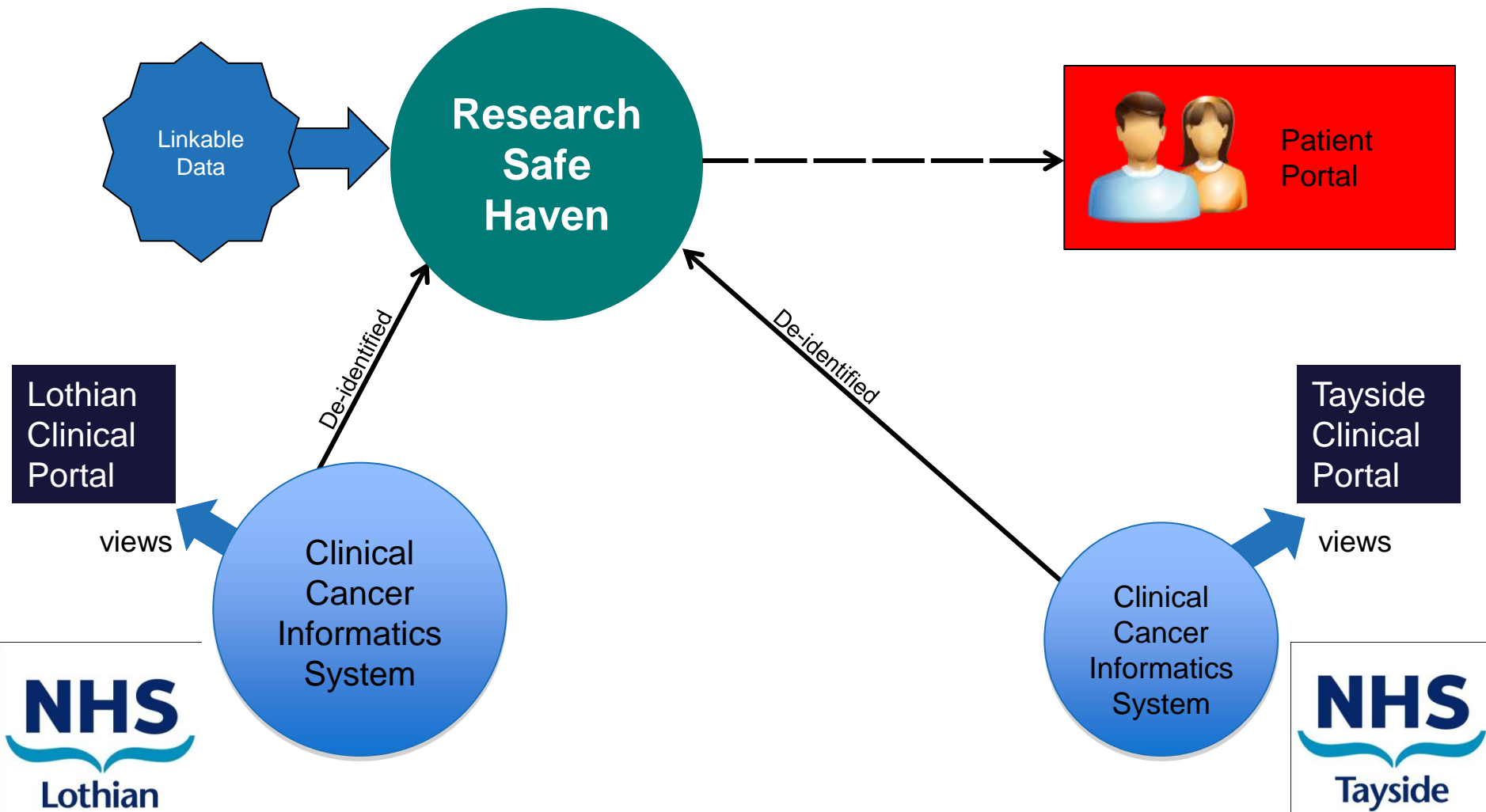
DECIPHER
HEALTH

Cancer Research Safe Haven

Simon Chapple
Aridhia Informatics
13th April 2012

Dundee Edinburgh Cancer Informatics
Programme: Harnessing Excellent Research

What is DECIPHER Health?



Primary Aim

Scalable, population-based commercial solution for the the storage, integration, retrieval and analysis of electronic patient records, tumour imaging and assay data.

Inclusion of multiple health systems and cancer types for use by cancer clinicians and researchers in academia and industry.

Ability to compare genetic variations with treatment effectiveness in the real world.



- **Breast**
- **Lung**
- **Prostate**
- **Renal**
- **Ovarian**
- **Colorectal**
- **Skin**

Example of Genes/Mutations to be available in DECIPHER

Tumour Type	Gene	Mutation	Examples of Associated Therapies
COLORECTAL	KRAS	Condoms 12, 13, 61, 146	Cetuximab/panitumumab
	BRAF	V600E/D/K/R/M	Sorafenib/Cetuximab
	TPS3	Exons 2-11	
	P13KCA	Exons 9 and 20	P13Kinase inhibitors
	UGT1A1	UGT1A1*28	Response to irinotecan
BREAST	P13KCA	Exons 9 and 20	
	TPS3	Exons 2-11	
	PTEN	LOH/mutation hotspots	mTOR inhibitors
	CYP2D6	5 SNPs	Response to tamoxifen
PROSTATE	PTEN	LOH/mutation hotspots	mTOR inhibitors
	TMPRSS-ERG	Junction fragment PCR	
	TLR4	2 SNPs	
LUNG	EGFR	Exons 18 - 21	Erlotinib/gefitinib
	EML4-ALK	Fusion product	PF-02341066 ALK/c-Met inhibitor
	XRCC2	5 SNPs	Response to platinum agents
	ERCC1	mRNA expression	
	RRMI	mRNA expression	
OVARY	PTEN	LOH/mutation hotspots	mTOR inhibitors
	P13KCA	Exons 9 and 20	
	BRAF	V600E/D/K/R/M	Sorafenib/Braf inhibitors
MELANOMA	BRAF	V600E/D/K/R/M	
	CKIT	Exons 11, 13, 17	

Source: CRUK 2011
Stratified Medicine
Programme : L.K Jones,
J. Peach, F.M Hemsley,
F. Reddington, A. Tuff,
R. Williamson, F. Willey,
P.W.M Johnson

DECIPHER Data Sources & Datasets

NHS Tayside data sources

TOPAS – patient administration system

CentralVision/Sunquest – labs data

RMS – referral management system

eCASE – cancer patient audit system

WISDOM – oncology system

ChemoCare – chemotherapy appointment system

Dermabase – skin cancer system

National

Cancer QPI datasets

GRO – morbidity records

ISD – cancer registry (from 1958)

NHS Lothian data sources

TRAK – patient administration system

iLAB – laboratory data, including pathology, biochem & haematology

SCI Store – additional patient activity data

ePharmacy, SAHSC tissue bio repository, PACS

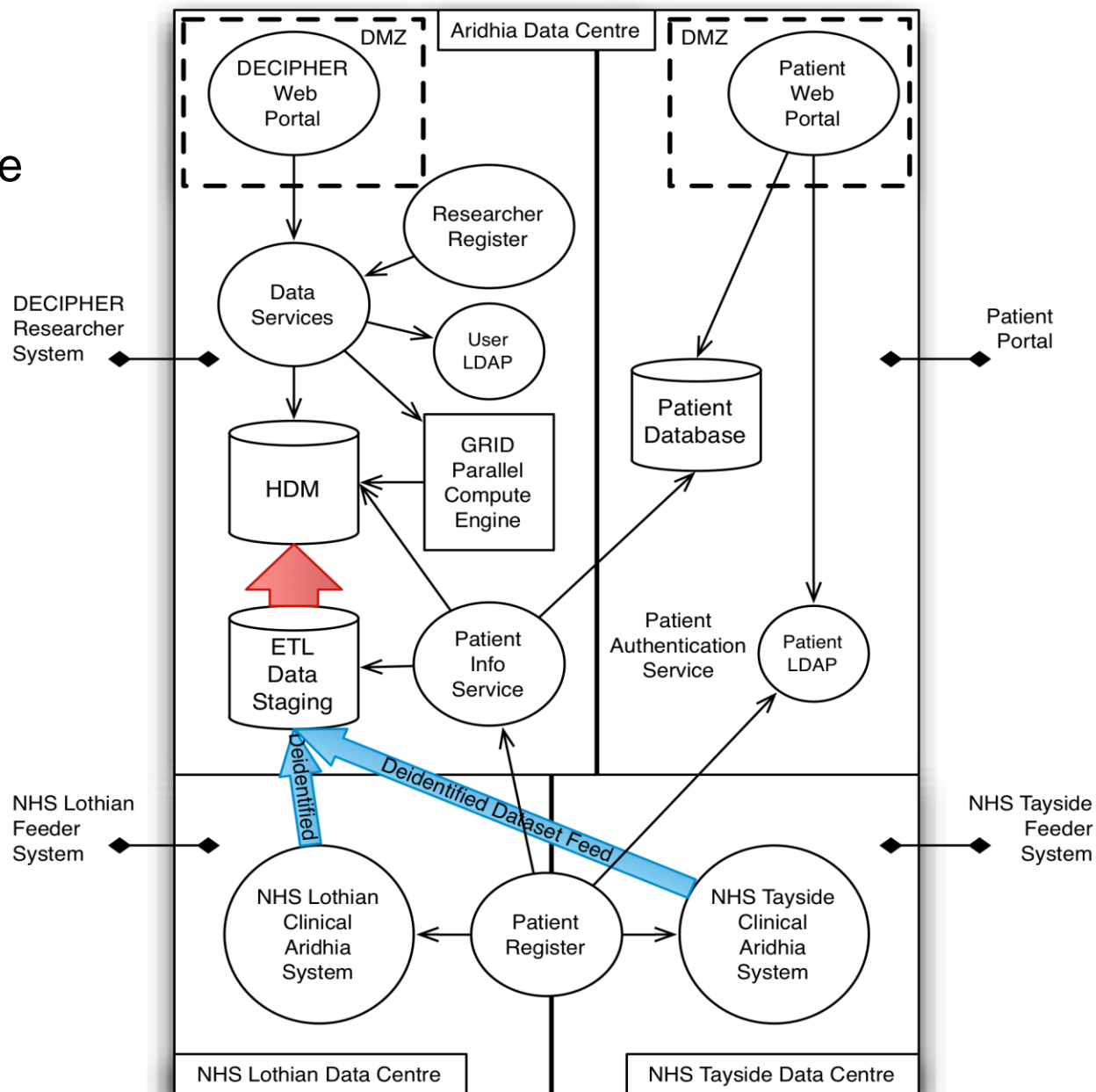
University of Edinburgh

ECMC – anonymised clinical datasets for testing, tissue bio repository and database

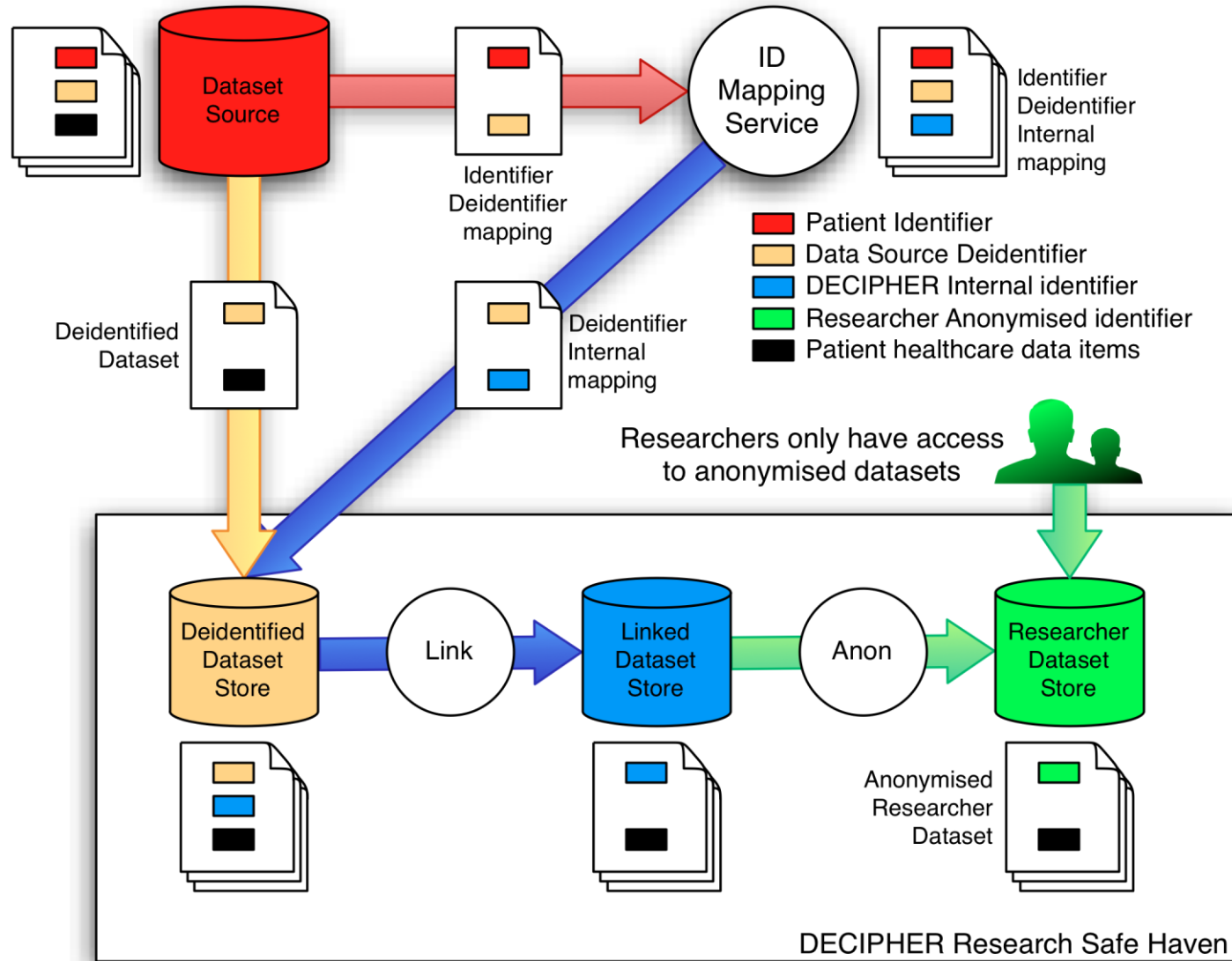
University of Dundee

Breast Cancer Tissue Bank

Overall System Architecture



DECIPHER System Architecture for Dataset Import



DECIPHER for Researchers

Provide general analytic framework and configurable toolkit

Self service

- Define specific patient cohorts within the system
- Create own datasets from source data field dictionary
- Create new measurement fields both at patient dataset and summarisation levels
- Create own reporting from customisable templates with support for publication

Don't take data out,
Put your analysis in!

Reuse

- Employ pre-existing datasets and statistical / bioinformatics analysis
- Capture project workflow as viewable/reusable “app” within DECIPHER web portal

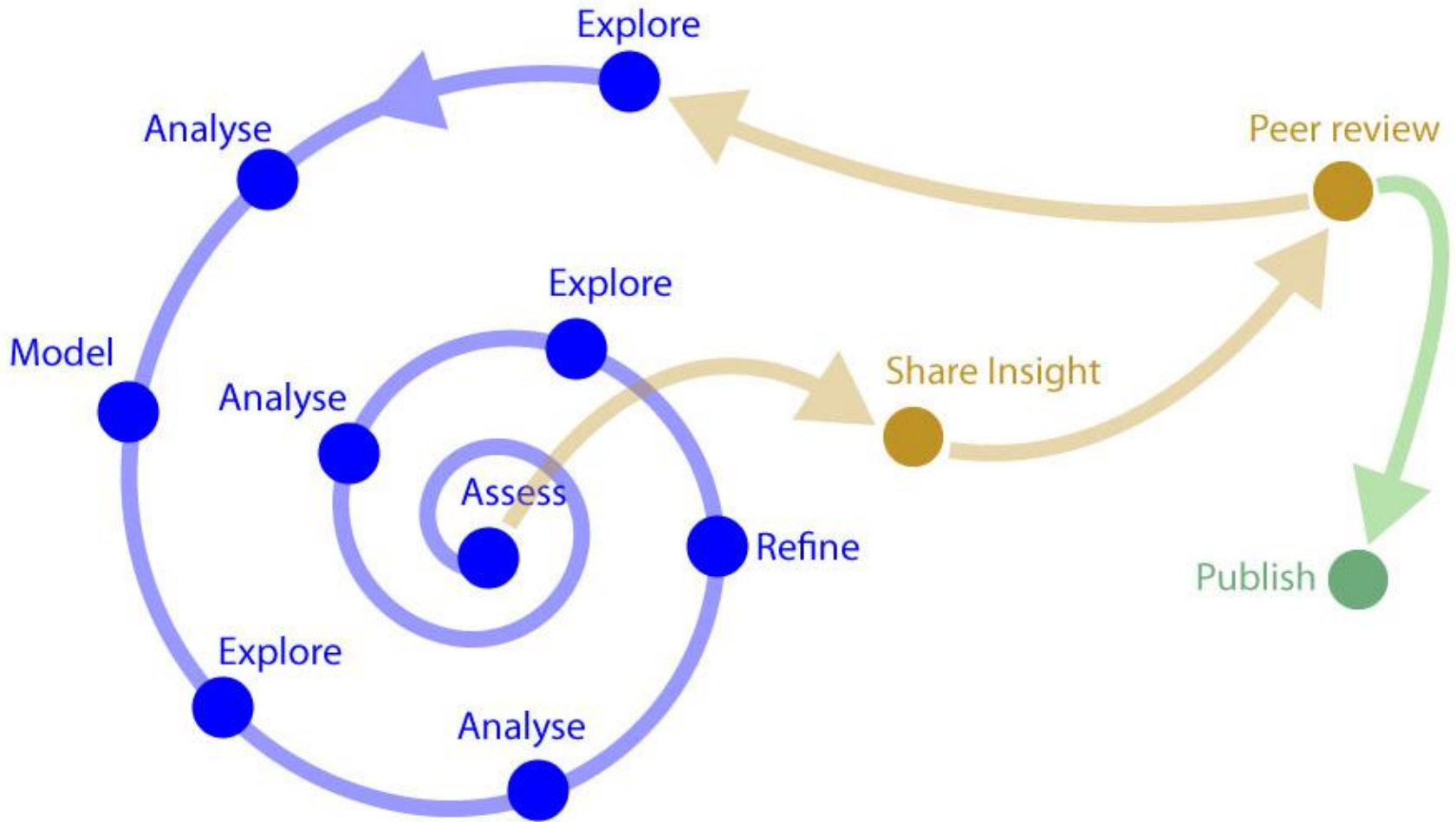
Access unique HPC resources

- Support for bio-image data processing
- Upload/define your own programs for accelerated analysis

Collaborate and share insight

- Utilise intra/extra-group commentary and review, supported by contextualised search
- View other DECIPHER datasets / projects / publications similar to your research

Researcher Workflow



Technology Manifest



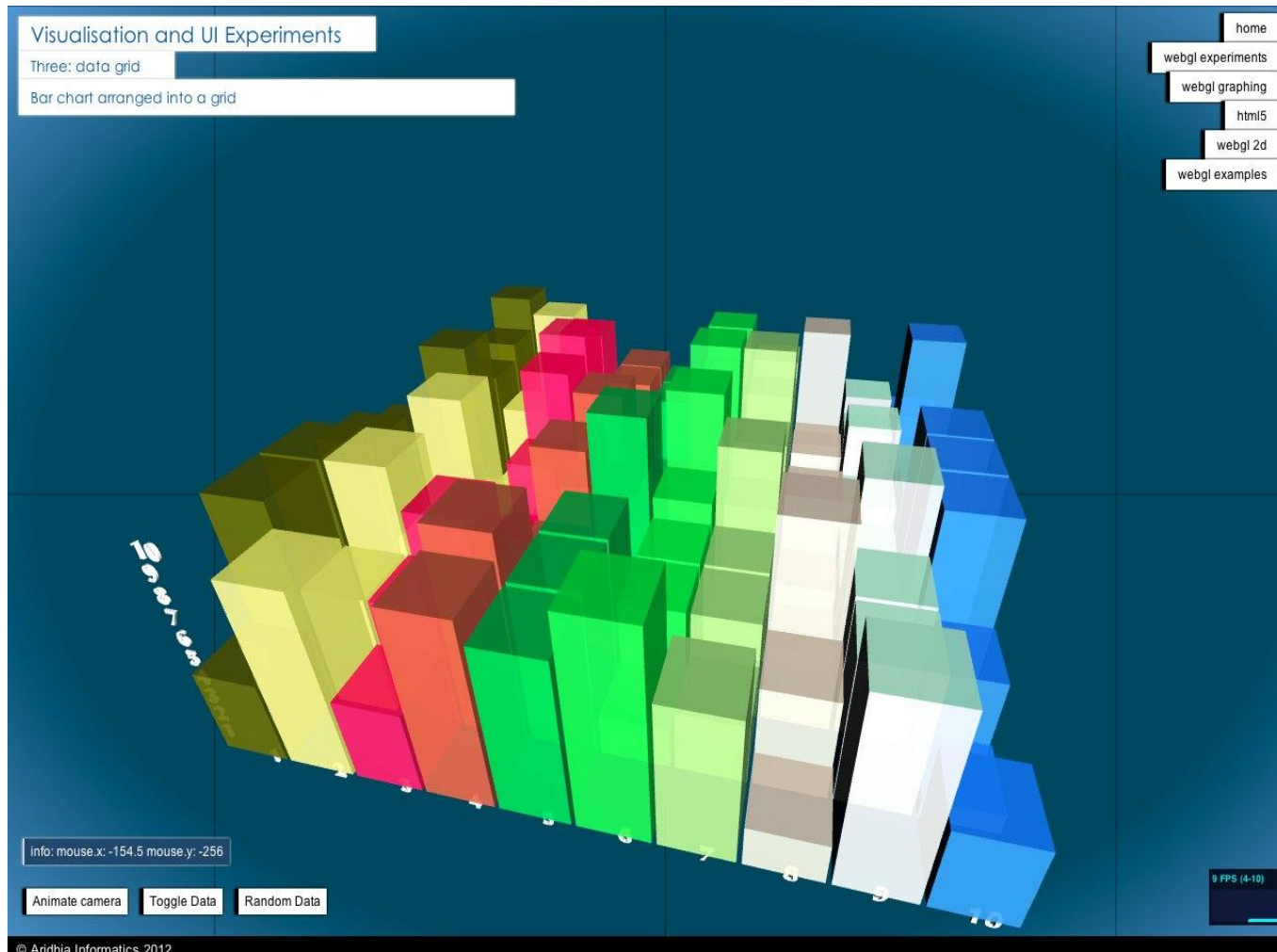
Preview profiled data for initial selection

A Researcher will be able to view high level aggregation profiles of the data in the system to determine what may be useful for their project.

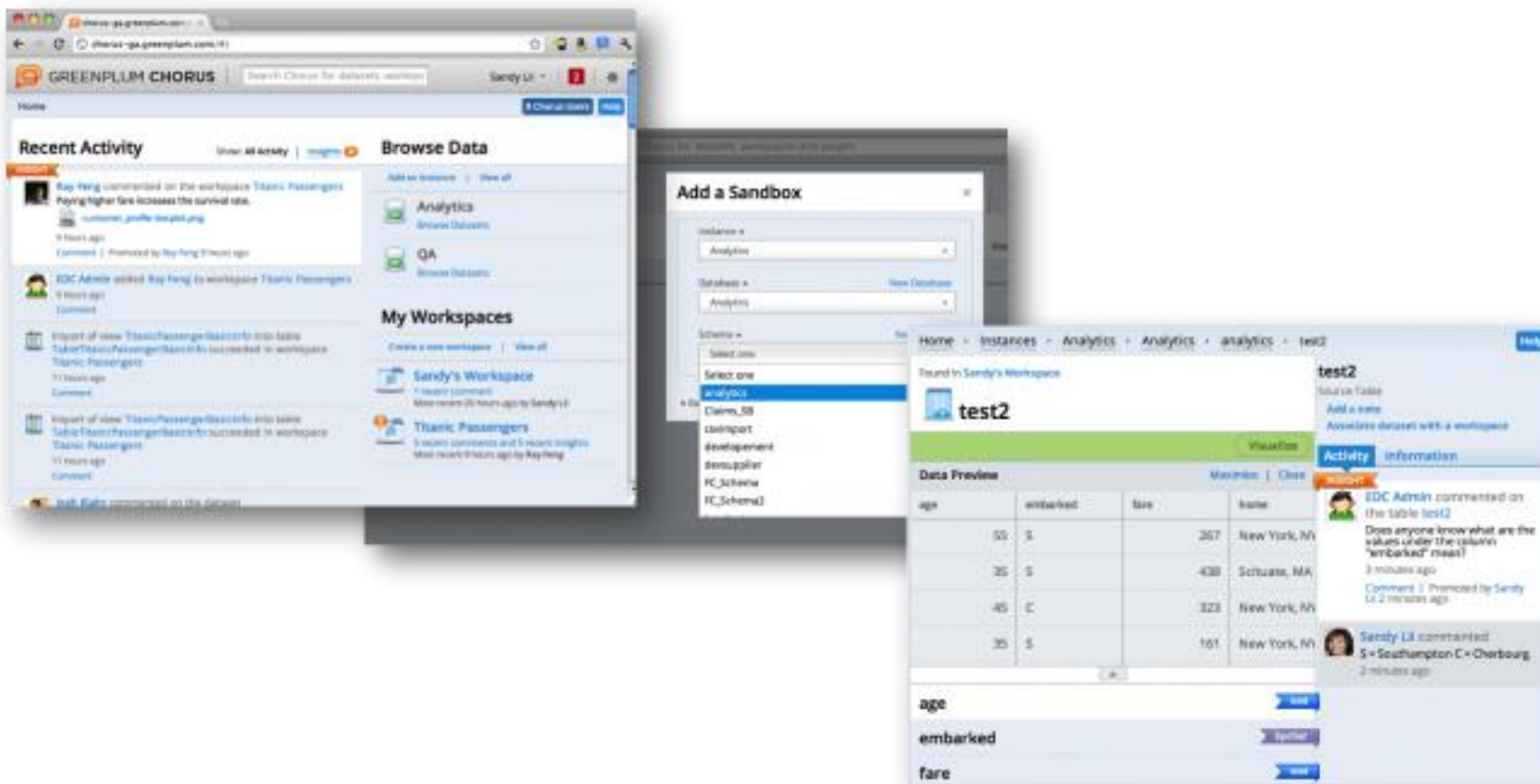


Which data profiles Researchers can see is governed by dataset level permissions.

Explore with highly interactive, accessible data visualisation



Collaborate safely/appropriately driven by contextual relevance



Breast Cancer Demonstrator Screenshots

BCD Researcher: Define Cohort for Study

HOME APPLICATIONS CANCER INFORMATICS Signed in as ciclinician Sign out

Patient Cohorts

Searches

invasive malignancy Search Save Cohort

Results

CHI	Biopsy date	Report	Selected
4141763313460732134	01-APR-11 00:01		<input type="checkbox"/>
14211306073579504953	06-APR-11 00:01		<input checked="" type="checkbox"/>
9189169720605569669	01-APR-11 00:01		<input type="checkbox"/>
11964262700991985578	01-APR-11 00:01		<input type="checkbox"/>
6855697071090881227	10-FEB-11 00:01		<input checked="" type="checkbox"/>
12460644425403689884	06-JAN-11 00:01		<input checked="" type="checkbox"/>
15688660013709940685	31-MAR-11 00:01		<input checked="" type="checkbox"/>
7220624114701015855	01-APR-11 00:01		<input type="checkbox"/>
15274830273228913647	25-MAR-11 00:01		<input checked="" type="checkbox"/>
6850930077181949879	30-MAR-11 00:01		<input checked="" type="checkbox"/>

10 Page 1 of 491 Displaying 1 to 10 of

Report

Terms

invasive malignancy(1)

Micro Report

Sections confirm the presence of scarring and the adjacent skin shows non-specific chronic inflammation that has a perivascular location. This and some other minor changes are in keeping with previous surgery and prior radiotherapy. There is no evidence of residual in situ or **invasive malignancy**. No residual breast elements are identified within the sampled material.

Left mastectomy scar - No evidence of malignancy.
- Scar confirmed.
- Non-specific inflammation and changes suggestive of prior radiotherapy.

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BCD Researcher: select data for study

HOME APPLICATIONS CANCER INFORMATICS Signed in as ciclinician Sign out

Create Datasets

Field Dictionary Create Field Derived Fields Filters

The field dictionary contains the currently defined fields available. Select a field from the menu to view information about the field. Type words into the quick search box to bring up a list of fields containing that word

Available Fields

Date of First Treatment

- Date of Needle Core Biopsy
- Final Definitive (or Only) Surgery Performed to Breast
- Final Definitive Surgery Performed to Breast- Other
- Date of Final Definitive (or Only) Surgery Performed to Breast
- Date of First Definitive Breast Surgery
- Surgery Performed on Axilla- Other
- Surgery Performed on Axilla- Other
- Level of Axillary Clearance
- Mode of First Treatment
- Date of First Treatment
- Reason for Delay in First Treatment (2005)
- Reason for Delay in First Treatment (2001)
- Radiotherapy (Type)
- Radiotherapy- Other
- Date Radiotherapy Started
- Date Radiotherapy Completed
- Site of Radiotherapy 1 (Site to which Radiotherapy Given)
- Site of Radiotherapy 1 Other
- Site of Radiotherapy 2 (Site to which Radiotherapy Given)
- Site of Radiotherapy 2 Other

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Selected Items

Fields you have added to the dataset will appear here. if you wish to reorder your fields you can pick them up with the mouse and drag them into a new position within the list.

Fields

- CHI Number from Patient Identifiers
- Patient Gender at Birth from Patient Details
- Date of Cancer Referral from Patient Identifiers
- Date Referral Received from Patient Identifiers
- Date of First Treatment from Surgery

Filters you add will appear here, there is no effect in reordering of filters

Filters

Field Selector

The fields that have been added to this DataView

BCD Researcher: refine and extend the data view

Create Datasets

Field Dictionary | **Create Field** | Derived Fields | Filters | Selected Items

Derived fields can be created by combining and comparing existing dictionary fields. Select a field from each of the menus and an action to perform on them. Available actions will be determined by the type of data in the fields selected.

Action: Difference between A and B

Field A: Date of Cancer Referral

Field B: Date of First Treatment

To describe your field please enter the description below:
The number of days between the referral and the first treatment

To save your field please give it a name. If you use spaces replaced with underscore characters
Ref_2_Treat

Create Datasets

Field Dictionary | Create Field | **Derived Fields** | **Filters** | Selected Items

Field to Filter on: Patient Gender at Birth

Fixed (filter will be applied on server and cannot be changed by user)

Not known (not recorded)

Male

Female

Not specified

Add Filter: Females_Only

Fields you have added to the dataset will appear here. If you wish to reorder your fields you can pick them up with the mouse and drag them into a new position within the list.

Fields:

- CHI Number from Patient Identifiers
- Patient Gender at Birth from Patient Details
- Date of Cancer Referral from Patient Identifiers
- Date Referral Received from Patient Identifiers
- Date of First Treatment from Surgery
- ref_2_treat from Derived Fields

Filters you add will appear here, there is no effect in reordering of filters

Filters:

- Females_Only

Save your dataset for future use

Save your DataView

BCD Researcher: determine patient outcomes

The screenshot displays the BCD Researcher interface. The top navigation bar includes 'HOME', 'APPLICATIONS', and 'CANCER INFORMATICS'. The user is signed in as 'ciclinician'. The main content area is titled 'Patient Outcomes' and features a sidebar on the left with 'Filters', 'Cohorts', and 'Dataviews'. The 'Filters' section includes 'REFDATE' and 'FIRSTTREATDATE'. The 'Cohorts' section shows 'No cohort selected'. The 'Dataviews' section shows 'Patient_Referral_To_Treatment'. The main table is titled 'Patient List' and 'Survivability', with options for 'Excel', 'CSV', and 'Show/Hide Columns'. The table contains columns for 'CHINUM', 'Gender', 'REFDATE', 'REFRECDATE', 'FIRSTTREATDATE', and 'Ref 2 treat'. The table is paginated, showing 'Page 1 of 61' and 'Displaying 1 to 30 of 1826 items'. The footer includes 'build:7956' and 'Copyright © 2011 Aridhia Informatics Ltd. | Third party licensing'.

Filters

Cohort Selector

DataView selector

CHINUM	Gender	REFDATE	REFRECDATE	FIRSTTREATDATE	Ref 2 treat
15177539394264964871	Female	07-SEP-09	07-SEP-09	22-OCT-09	45
18050294574452229251	Female	06-OCT-09		12-NOV-09	37
15415255433196658246	Female	25-JUN-09		30-JUL-09	35
16077808150100623580	Female	21-SEP-09	25-SEP-09	14-OCT-09	23
4078764492983466224	Female	09-MAR-11	09-MAR-11	14-APR-11	36
12400644719537368663	Female	23-OCT-07		17-JAN-08	86
689150565640122142	Female	23-MAY-07	24-MAY-07	25-JUN-07	33
13713180750856383643	Female	23-JUN-09		28-JUL-09	35
1649514515886990364	Female	06-JUN-07		03-JUL-07	27
7787141012807850397	Female	29-DEC-09	29-DEC-09	09-MAR-10	70

BCD Researcher: R-based Kaplan-Meier survivability

