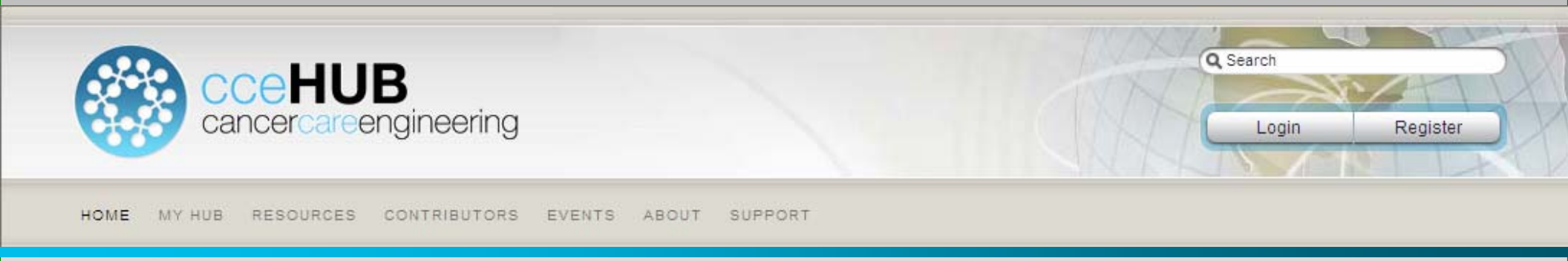
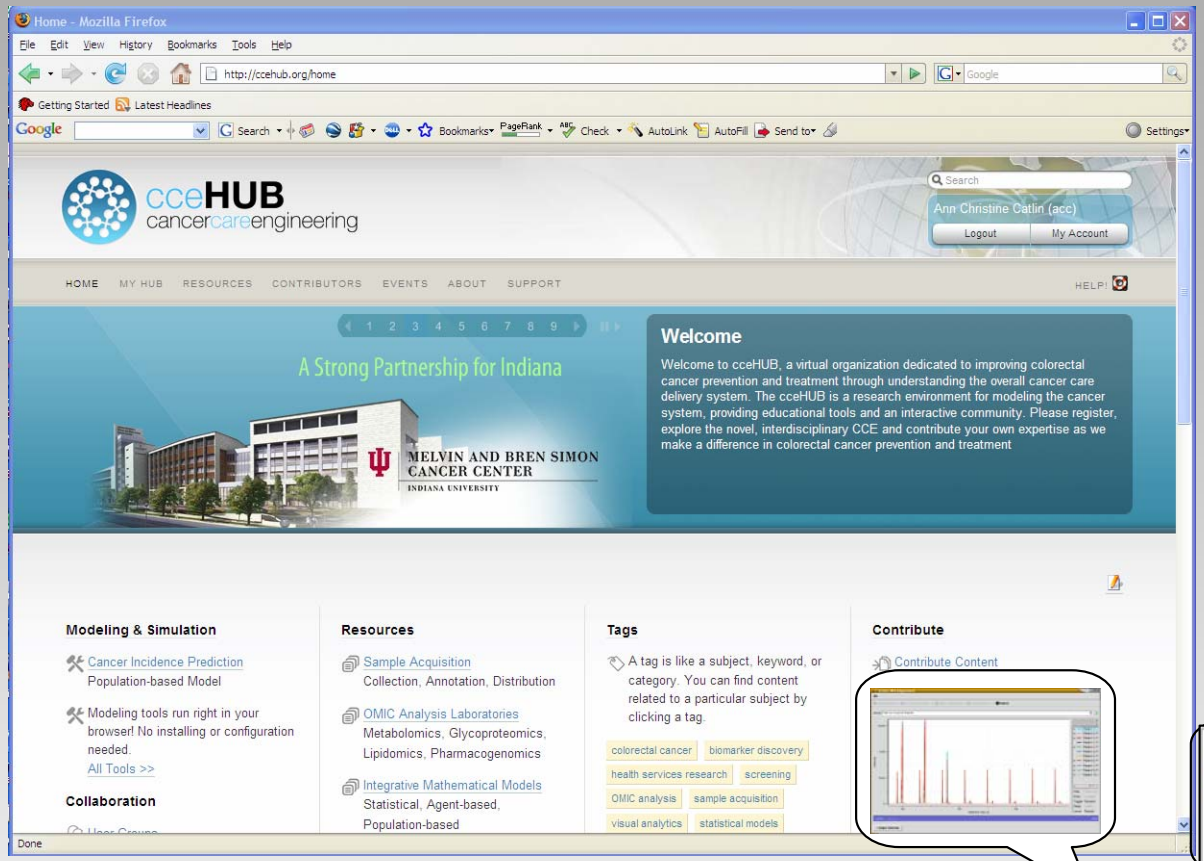
cceHUB



A Knowledge Discovery Environment for Cancer Care Engineering Research

Ann Christine Catlin
HUBzero Workshop
November 7, 2008

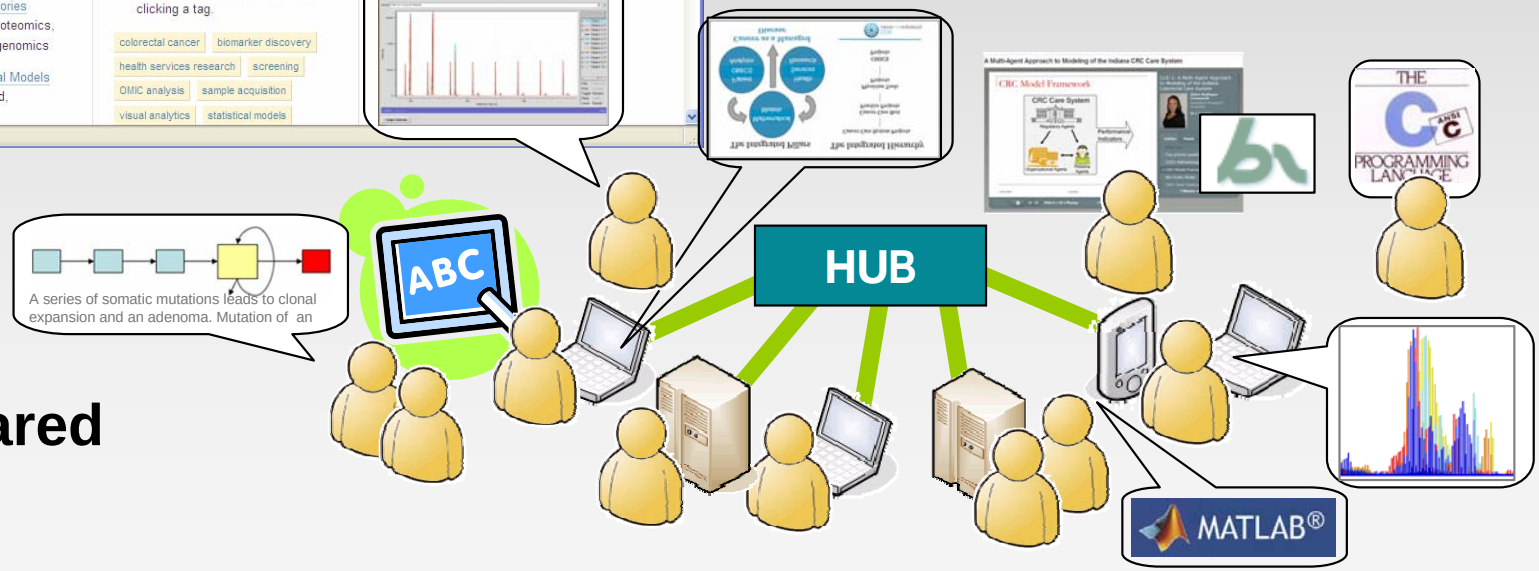
a HUB for Cancer Care Engineering



integrate/synthesize biological OMIC data

→ biomarker knowledge

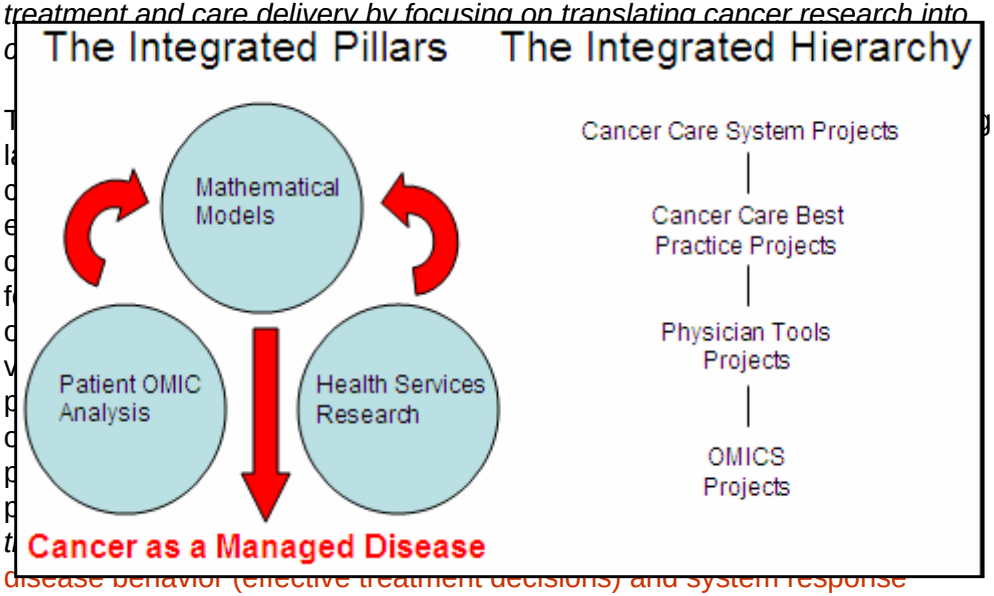
- OMIC Analysis Labs
- Statistical Modelers
- Visual Analytics



Support for Community-shared Resources

CCE integrated project hierarchy

The Cancer Care Engineering (CCE) project is a highly innovative, interdisciplinary, multi-institutional endeavor that holds promise for revolutionizing the current paradigms of cancer prevention, detection, treatment and care delivery by focusing on translating cancer research into



disease behavior (effective treatment decisions) and system response (efficient cancer care delivery).

… highly innovative, interdisciplinary, multi-institutional endeavor …

CCE TEAM: more than 70 scientists, clinicians, statisticians, physicians, nurses, engineers, computer scientists, health service researchers, university and hospital staff

IU Center for Health Services and Outcomes Research
Department of Medicine, IU School of Medicine
Department of Medicinal Chemistry and Pharmacology, Purdue University
School of Chemical Engineering, Purdue University
School of Electrical and Computer Engineering, Purdue University
Department of Statistics, Purdue University

Cancer Care Engineering Projects funded by the Regenstrief Foundation

CCE-1: A Multi-Agent Approach to Modeling of the Indiana CRC Care System

CCE-2: An Indianapolis CRC Quality Improvement Initiative

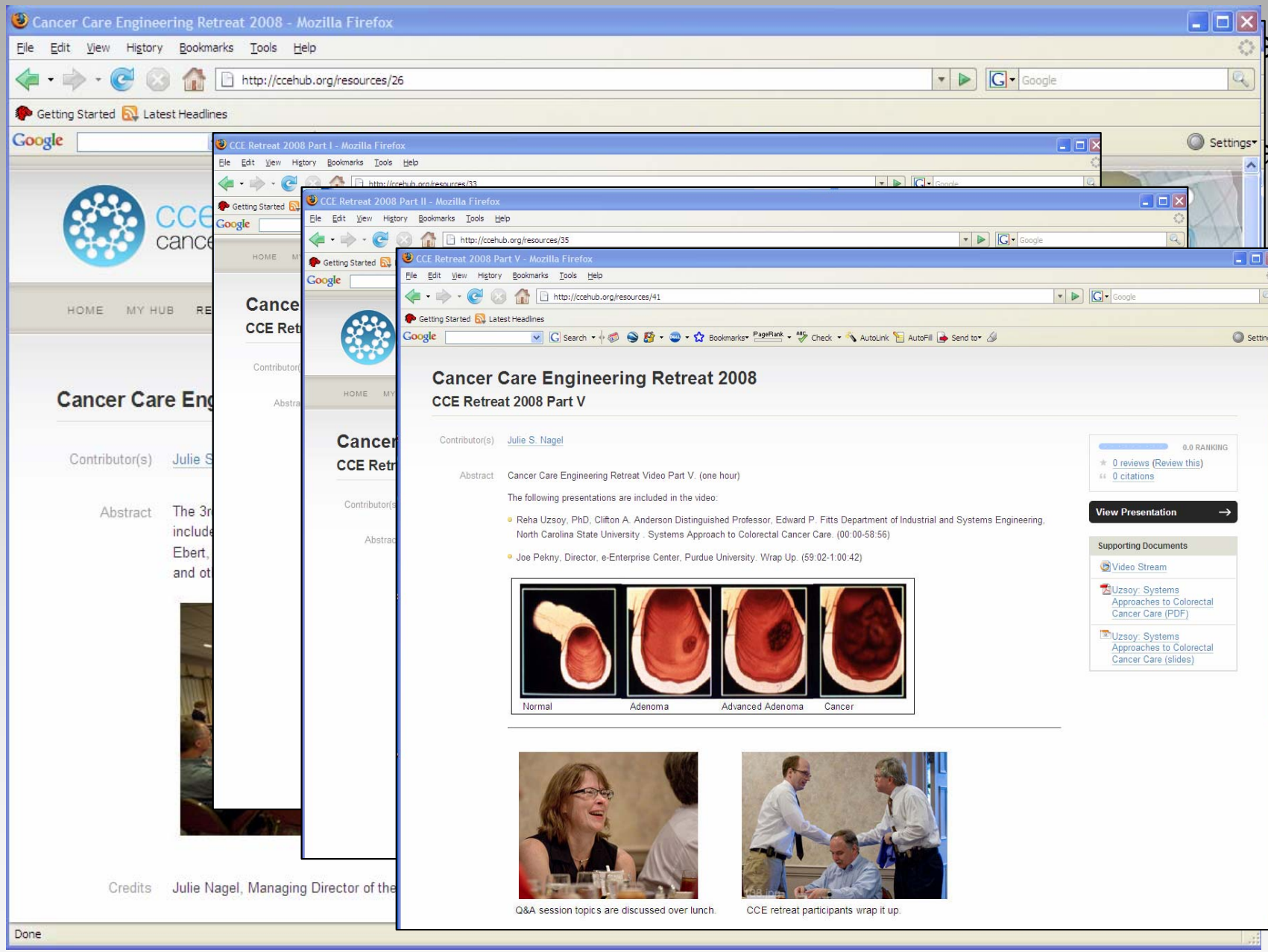
…

CCE-5: A Fusion Center for Cancer Care System Information – the Cancer Care

Laboratory Analysis, Conversion to Digital Data

…

CCE team: collaboration !



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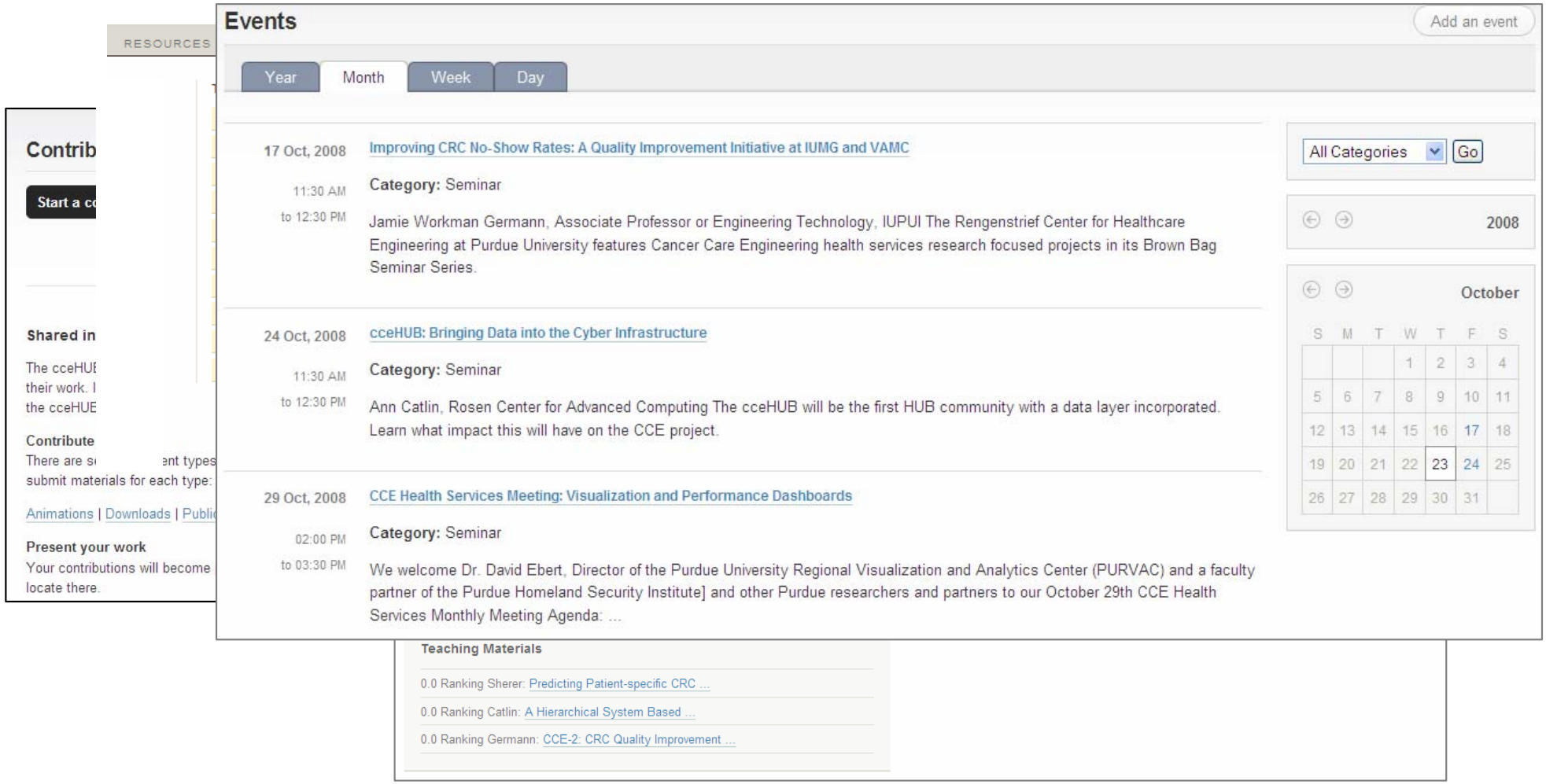
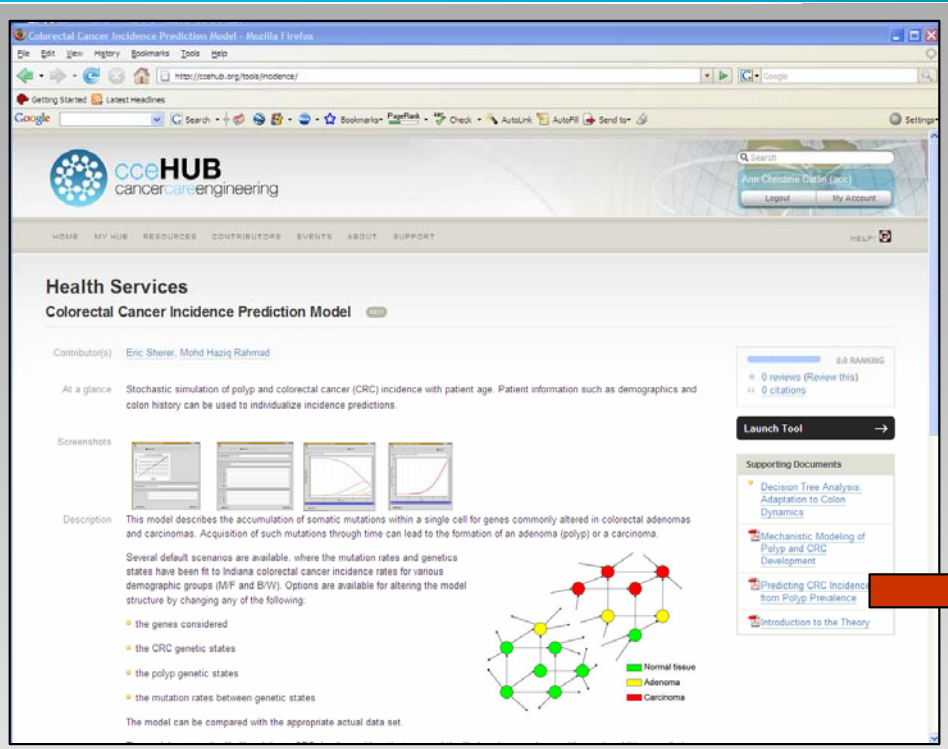
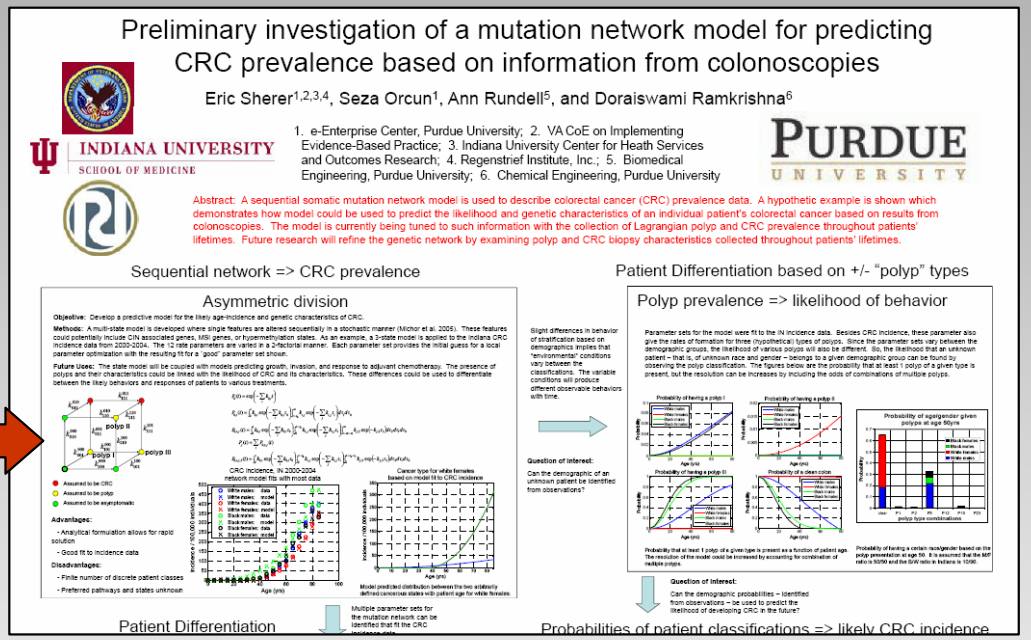
Using HUB Technology I

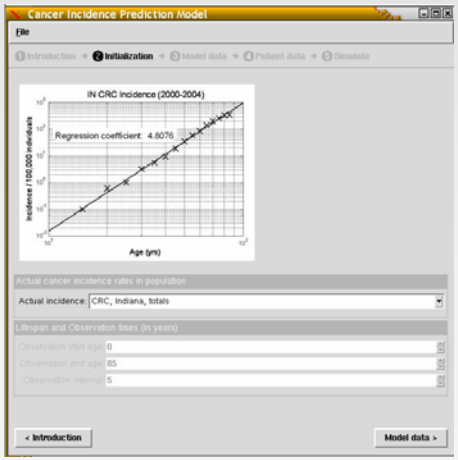
- Content Management System for Scientists
- Collaboration and Social Networking

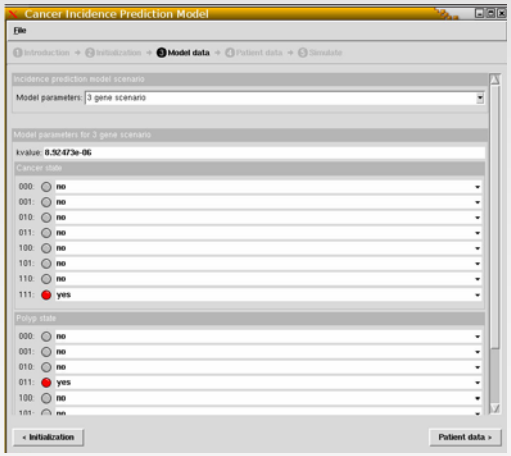


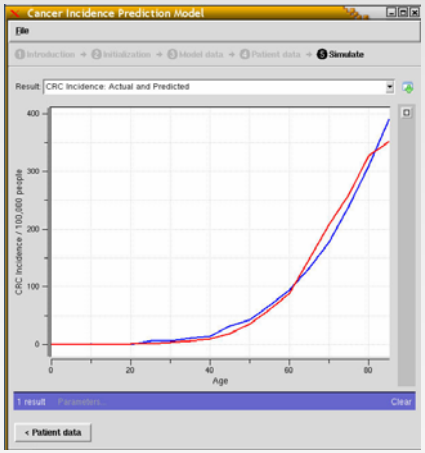
Integrative Mathematical Models

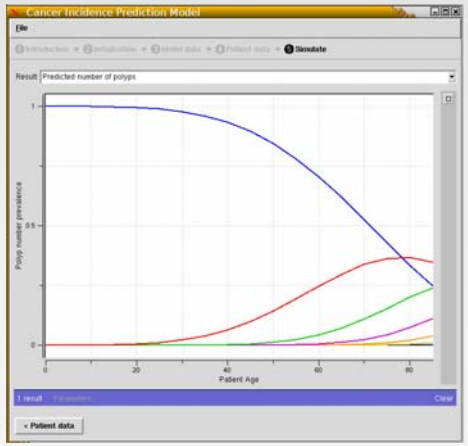




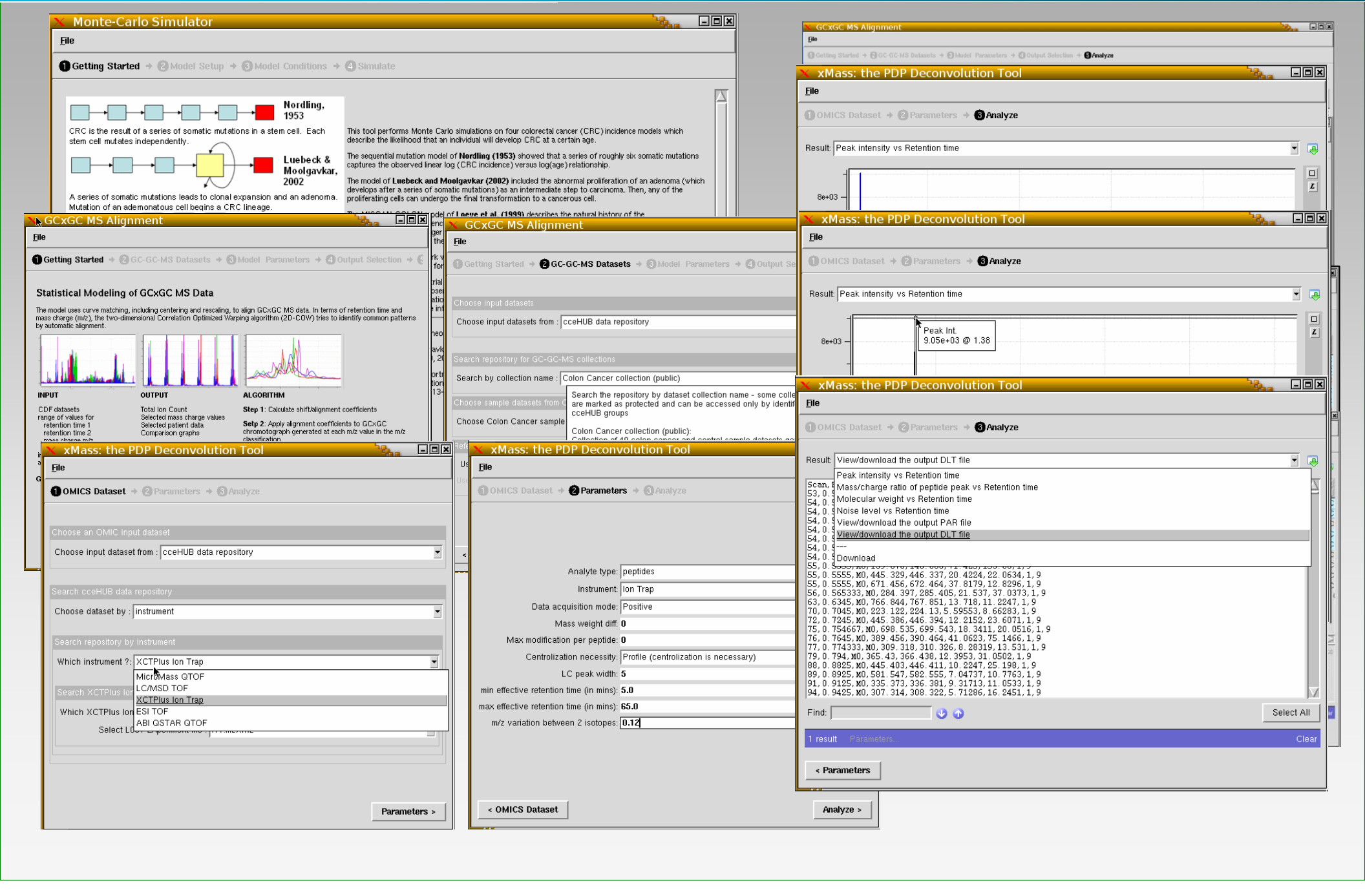






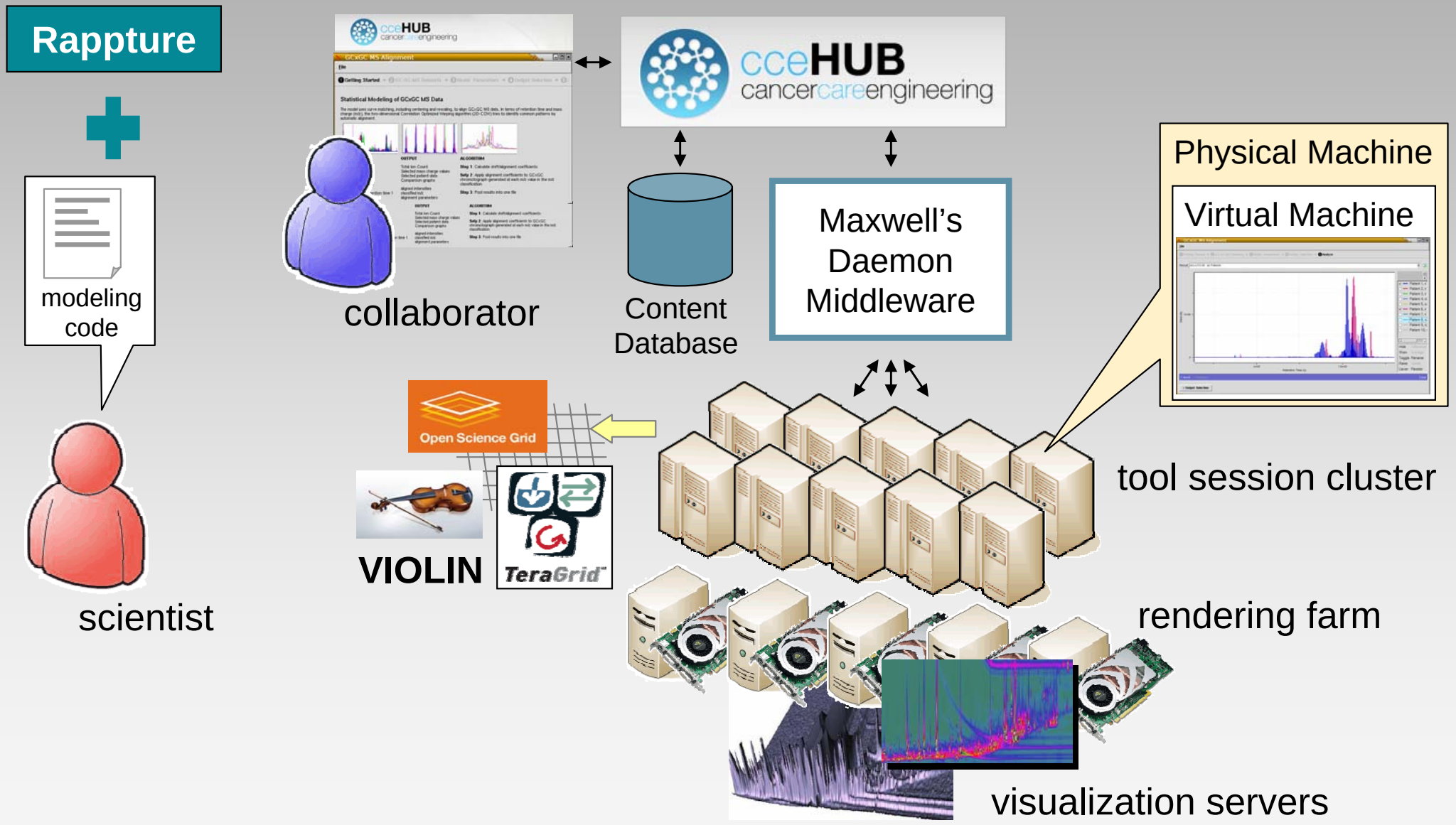


Shared models need shared data ...



Using HUB Technology II

- Unique Middleware for Modeling and Simulation



What we need to support that's new …

- OMIC workflow
  - biosamples → biological data → biomarker knowledge … "data lifecycle" support
  - end-to-end user support
- Data … the new shared resource
  - data repository & data support infrastructure
  - metadata … annotate, track, characterize content

OMIC experiment workflows

IU Simon Cancer Center

Sample acquisition
processing
transfer

Bindley Biosciences Laboratories

Sample preparation
Instrument analysis
Data generation
raw instrument data
pre-processed data

RAW DATA

PRE-PROCESSED DATA

BLOOD SAMPLE
CRC PATIENT/CONTROL

clinical database, demographics, diet, diagnosis, treatment

transfer to Purdue

LECO
GC GC MS

instrument generated

PEG

350MB
spectrum, list of peaks,

data converters

35MB
peak list

CSV

CDF

1.2GB
retention times, m/z, intensities

data converters

TXT

DAT/RAW

more ...

SAMPLE DATA
converted, reduced, selected, filtered, transformed

sample →

datasets →

annotation	Interactive GUI
protocols	Document library & document tagging
tracking	Metadata processing
external DB linkage	Communication & information exchange
annotation	Interactive GUI
methods	Document library & document tagging
upload	Data transfer
tracking	Metadata processing
storage	File server & backup
metadata linkage	Metadata processing

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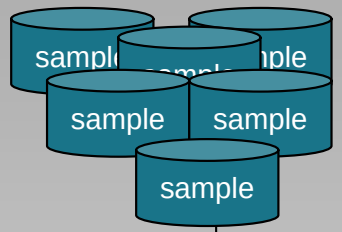
OMIC data analysis workflows

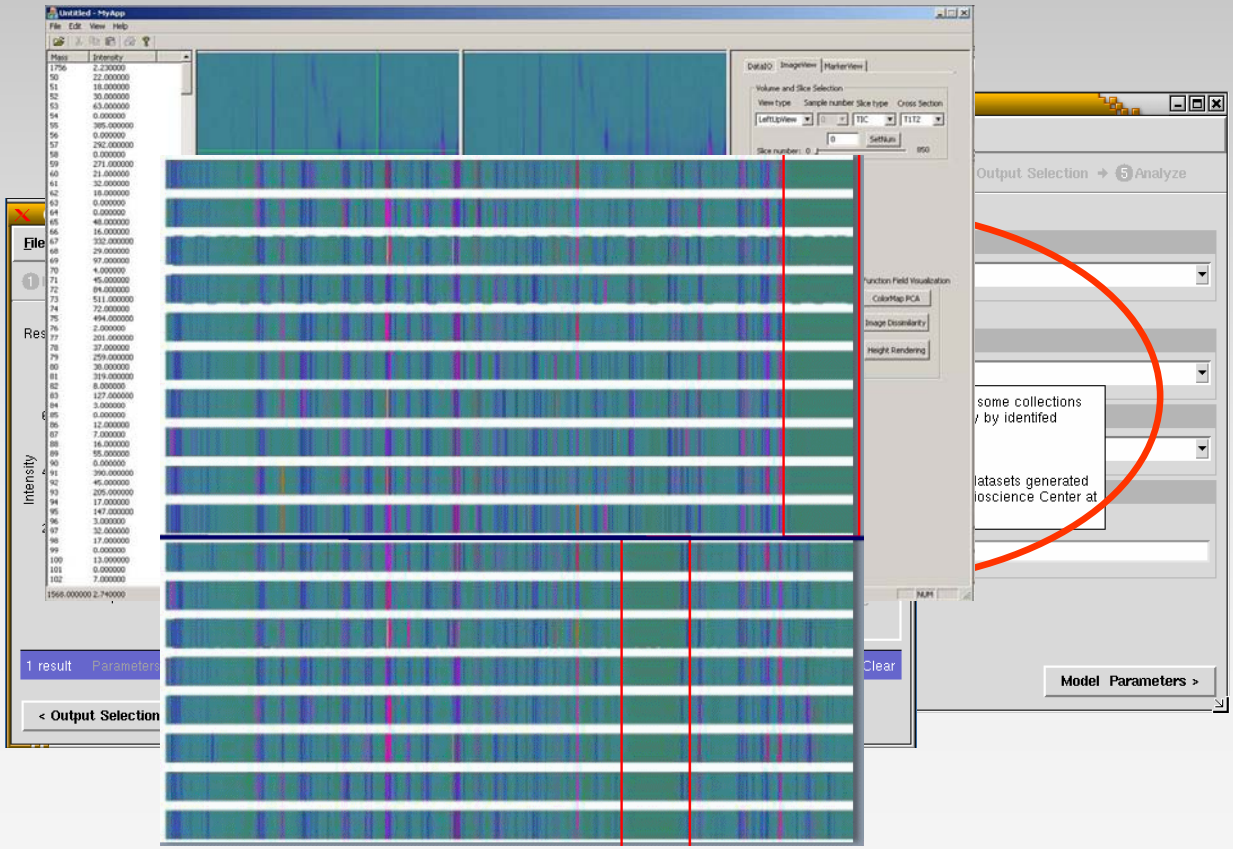
Laboratory Analysis
Statistical Modeling
Visual Analytics

Processing multiple samples
Comparisons across samples
Modeling across samples
Visualization across samples



ANALYZED DATA

datasets



- data exploration
- ontology support
- visualization
- modeling
- data tracking
- tool tracking
- data capture
- annotation
- metadata linkage
- storage

cceHUB

a HUB data support framework

Data Explorer

Metadata-based Query

Data Upload | Process Tracking | Results Capture

Data Annotation, Content Characterization & Tracking

OMICS Data File Repository | Metadata Database