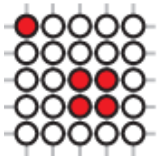


cancergrid

Accelerating Cancer Research Using Semantics-Driven Technology

James Brenton, Jim Davies,
Jeremy Gibbons, Steve Harris
MSES, Dec 2008

1. Phase III clinical trials

- randomized controlled studies to compare with existing treatments

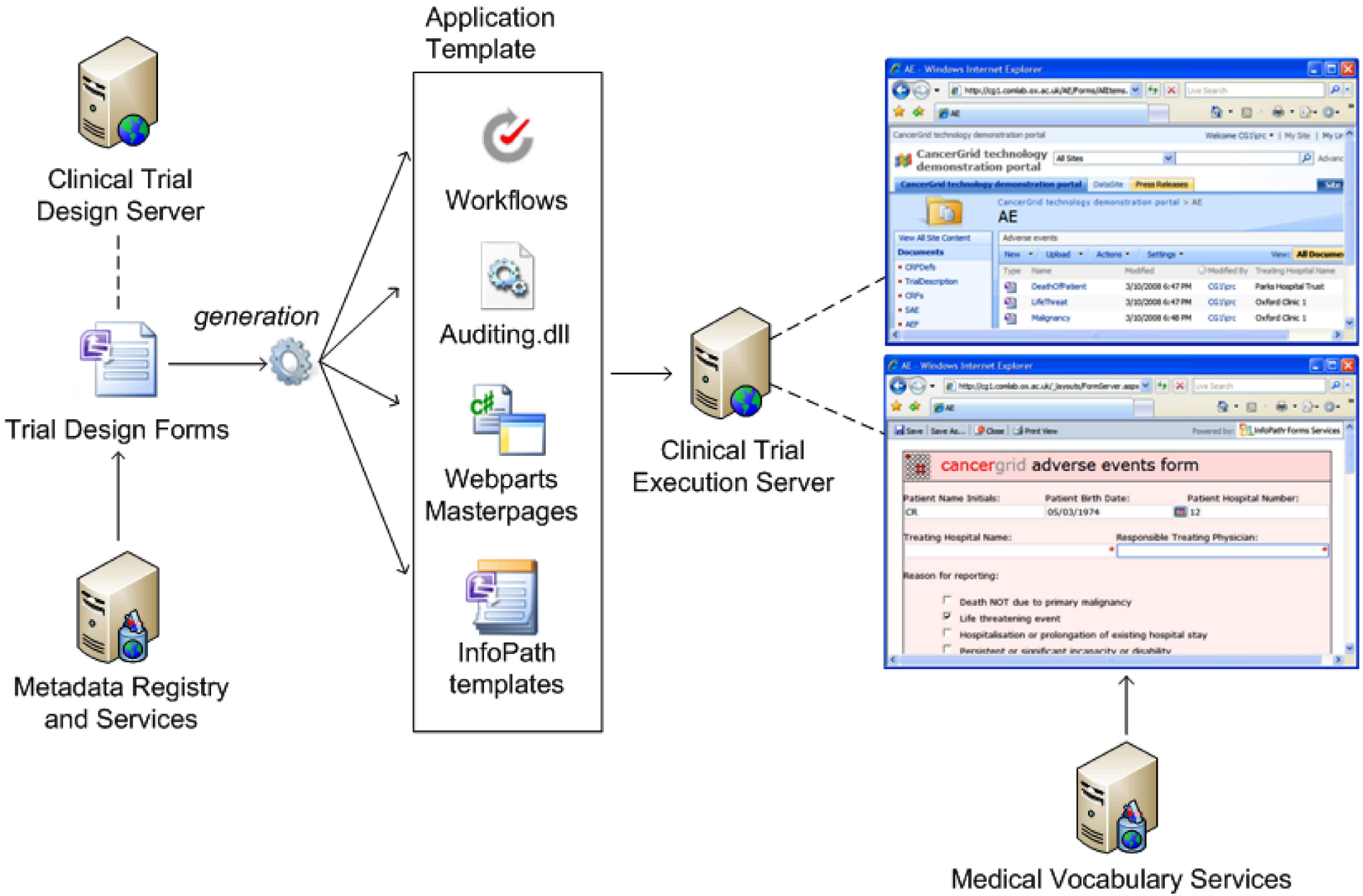
- individual trials tend to lack diagnostic power
- need *meta-analysis* to combine results
- requires semantic metadata for integration
- *better science*

- software support for clinical trials (forms, services, databases...)
- similar but different instances: a *software product line*
- custom software, but without hand-crafted implementations
- *less drudgery*

2. CancerGrid

- *metadata registries* for managing semantics
- *metamodel* of trial protocols, with tools for authoring protocols
- *model-driven generation* of software artefacts
- semantic information preserved throughout processing
- *breast cancer* clinical trials as exemplars

- universities of Oxford, Cambridge, London, Birmingham, Belfast
- UK Medical Research Council and Microsoft Research, 2005–2008


Application Template
Clinical Trial Design Server
generation
Trial Design Forms
Metadata Registry and Services
Workflows
Auditing.dll
Webparts Masterpages
InfoPath templates
Clinical Trial Execution Server
AE - Windows Internet Explorer
CancerGrid technology demonstration portal
AE
cancergrid adverse events form
Patient Name Initials:
Patient Birth Date:
Patient Hospital Number:
Treating Hospital Name:
Responsible Treating Physician:
Reason for reporting:
Death NOT due to primary malignancy
Life threatening event
Hospitalisation or prolongation of existing hospital stay
Medical Vocabulary Services

3. Semantics-driven technology

- *terminology services*

  collections of defined terms, and their relationships

- *metadata registries*

  observations, measurements, properties:
  terms, intended purposes, possible values

- *model repositories*

  schemas, services, forms, queries, reports;
  linked to metadata elements, propagating semantics

- *"semantic frameworks"*

- other application domains (eGov, logistics, libraries...)

4. Application to early-phase studies

- exploratory studies — from validation to discovery:
  first human experiments, small populations
- molecular and functional imaging
  to better understand the mechanisms of drug action
- four specific challenges arise:
  - metamodelling *marker studies* data
  - *federation* of metadata registries
  - semantic *integrity constraints*
  - *analytical techniques* and *tissue management*
- funded by Microsoft Research, 2008–2010
- hoping to accelerate clinically relevant discoveries in cancer care