H3A Genomics Capacity Panel Discussion

H3A meeting

06 October 2013
Sandton, JHB
South Africa

Reinhard Hiller, PhD, MBA
Managing Director
CPGR in the context of the NSI

National System of Innovation (NSI) / National economy

Output
Data, reports, new ideas

Outcomes
Knowledge, publications, IP, human resources, new projects

Impact
New products & services, funding, investment, in-licensing

Biotech innovation system / Bio-economy

HCD
Universities

Omics co.
Universities

Collab.
Universities

Commercial

Environment

Value
CPGR core competence areas

Cell culture assays

Recombinant protein expression

Genomics

Transcriptomics

Proteomics

Bioinformatics

Validation

Systems

Biology

Translation
Services & projects management

Level 1: Bio-consulting
- Request
- Consultation
- Study plan

Level 2: Bio-analysis
- Service / Project
- Report

Level 3: Bio-Informatics
- Data analysis
- Data-mining

Increasing levels of involvement

Key CPGR processes

Analytical process chain

Bioinformatics process chain

Support systems environment
Data storage and data management
Data management (LIMS), data analysis (Bioinformatics), data storage

Sample prep (liquid handler), sample storage (freezers), centrifuge, incubator

Adequate space / environment

- Available at CPGR
- Implementation to be completed by end of 2013
- Available through 3rd parties
- Dedicated funding applications in process of preparation
‘omics’ network orchestration

Orchestrator (CPGR)
- Pool of resources
- Pool of knowledge
- Common procedures
- Enhanced capacity
- Virtual research department
- Create IP supply
- Better absorb demand-driven research

New/additional roles
- Customer relations
- Marketing (channel mgmt)
- Project mgmt
- Quality mgmt
- Learning
- Knowledge mgmt

Autonomous partners
- CTLS (Core Technologies for Life Sciences)
- ABRF (Association of Biological Resource Facilities)
<table>
<thead>
<tr>
<th>DOMAIN</th>
<th>Core functions</th>
</tr>
</thead>
<tbody>
<tr>
<td>DIGITAL</td>
<td>Statistics</td>
</tr>
<tr>
<td></td>
<td>Bioinformatics</td>
</tr>
<tr>
<td></td>
<td>Data management</td>
</tr>
<tr>
<td>Funding &amp; IP</td>
<td>IP</td>
</tr>
<tr>
<td></td>
<td>Knowledge transfer</td>
</tr>
<tr>
<td></td>
<td>Financing</td>
</tr>
<tr>
<td>SCIENCE</td>
<td>Basic &amp; applied research</td>
</tr>
<tr>
<td></td>
<td>Education</td>
</tr>
<tr>
<td></td>
<td>Ethics</td>
</tr>
<tr>
<td>WET LAB</td>
<td>Biological assays</td>
</tr>
<tr>
<td></td>
<td>Bio-Analytics</td>
</tr>
<tr>
<td></td>
<td>Sample management</td>
</tr>
</tbody>
</table>
Complexity and cost of Genomics projects

Figure 1. Contribution of different factors to the overall cost of a sequencing project across time. Left, the four-step process: (i) experimental design and sample collection, (ii) sequencing, (iii) data reduction and management, and (iv) downstream analyses. Right, the changes over time of relative impact of these four components of a sequencing experiment. BAM, Binary Sequence Alignment/Map; BED, Browser Extensible Data; CRAM, compression algorithm; MRF, Mapped Read Format; NGS, next-generation sequencing; TAR, transcriptionally active region; VCF, Variant Call Format.

Sboner et al. Genome Biology 2011, 12:125
http://genomebiology.com/2011/12/8/125
Project example: Integration of data generation & capacity development

Phase 1: Sequencing
- miSeq Platform
- mRNA – 18 samples
- miRNA – 6 samples
- Duration 3-4 months
- Output – raw data

Phase 2: Basic Analysis
- Dedicated Bioinformatician
- Student Training
- Duration 3 months
- Output – basic data analysis as per specifications detailed in attached analysis description; Student trained in basic analysis

Phase 3: Advanced Analysis
- Dedicated Bioinformatician
- Student Training
- Duration 3 months
- Output – advanced data analysis as per specifications detailed in attached analysis description; Student trained in advanced analysis

8-12 months

OUTPUT VALUE:
- High Quality Data
- Highly skilled Student – increased capacity
- Achievement of Research Goals
Announcements

• GeneTitan / Axiom training - before end of 2013
• Affymetrix – clinical applications (Cytoscan, Oncoscan, DMET Plus) – Nov 2013
• Affymetrix GeneTitan – custom array design and ht genomic applications – Nov 2013