Introduction to the FAANG project

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ENCODE project

Purpose: to determine the functional elements of the human genome

Rationale for project
– SNPs associated with disease/traits are often inter-genic
– evolutionary comparisons have shown that some inter-genic and non-translated regions are strikingly well-conserved

So we must understand function of “non-genic” regions of genome!
ENCODE described

To understand function:

a) what part is transcribed into RNA? - **RNAseq**

b) what regulatory mechanisms control this transcription:

- **Landmarks bound by regulatory proteins**
- **Chromatin modifications** also mark transcription and “openness”
- **Methylation** of DNA is associated with regulation as well
- **Chromatin interactions**
ENCODE results

Collecting all these data (hundreds of experiments) allowed **predictive models** for genome function to be developed

- Predicts **Chromatin State** in the genome- OPEN or CLOSED, function

- Created a **Segmentation map of function** across the genome
Success in ENCODE required:

- High quality reference genome sequence
- **Standardized** infrastructure providing
  - Biological resources
  - Bioinformatics tools
  - Databases
- Effective coordination and communication

*FAANG needs all these to succeed!*
Main current activities

- Establish set of Core assays, begin to develop ENCODE-type functional data
- Develop tissue description, storage and sharing protocols
- Develop computational tools to analyze data
- Develop bioinformatics infrastructure
- Develop communication mechanisms
## FAANG Pilot and FAANG-related projects

<table>
<thead>
<tr>
<th>Species</th>
<th>Leading Inst. &amp; country</th>
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<tbody>
<tr>
<td>pig, cattle, goat, chicken</td>
<td>INRA, France</td>
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<tr>
<td>pig, cattle, chicken</td>
<td>UC-Davis, US</td>
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<td>horse</td>
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<td>‘Arctic Ark’</td>
<td>Natural Resources Institute, Finland</td>
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Global FAANG Consortium

Organic growth of FAANG during 2015-2017
Current FAANG contributors = >350

2014 membership - GB authors
2017 membership
Institutions supporting FAANG

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