



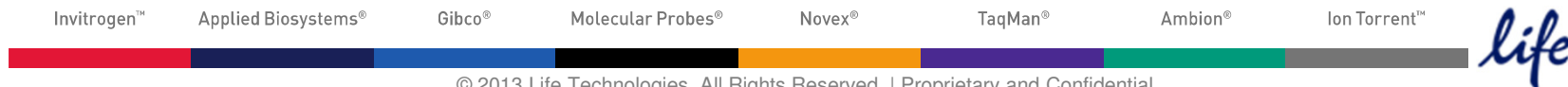
H3 Africa Meeting, Johannesburg South Africa

Global Enterprise Services

End to end solutions for genomic discovery and diagnostics

Paul Mola

Business Leader, Enterprise Solutions



LIFE: Quick Facts



**Unique breadth & depth to
provide enterprise solutions**

Invitrogen™

Applied Biosystems®

Gibco®

Molecular Probes®

Novex®

TaqMan®

Ambion®

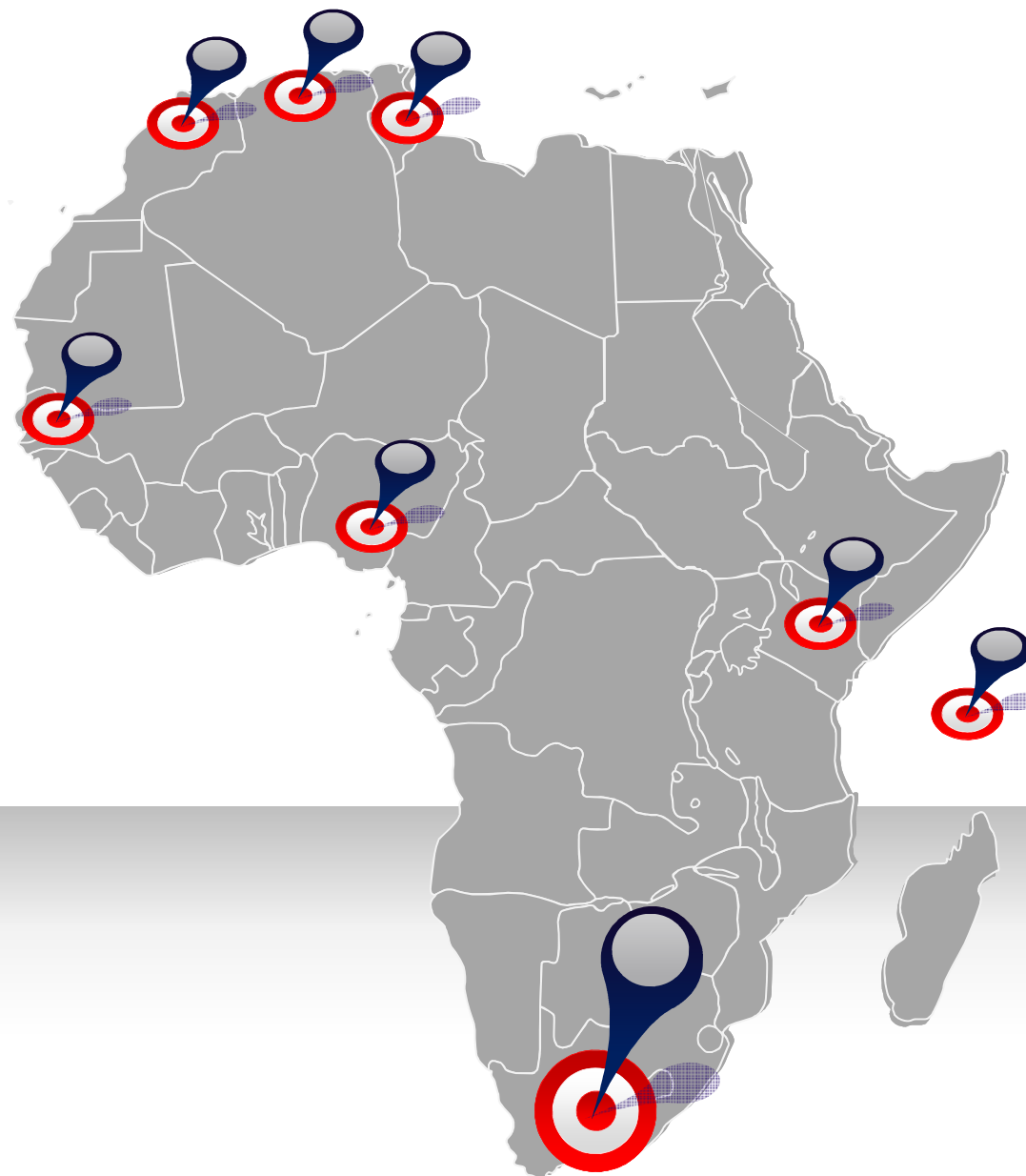
Ion Torrent™

life

AFRICA – Life Technologies

Highlights

- 20 years presence in Africa
- Direct operations in South Africa and Southern Africa
- Regional Partners
 - East Africa = ABL (Kenya , Tanzania, Uganda, rwanda , Somalia , Ethiopia , Burundi)
 - West Africa = Sotelmed (Senegal , Cote D'Ivoire , Benin, Cameroon ,...)
 - Nigeria = HTDS
 - Algeria + Tunisia = HTDS
 - Morocco = Genome Bio
 - Mauritius + Madagascar = Proximed
- 30 people fully certified for technical and applications support based in Africa

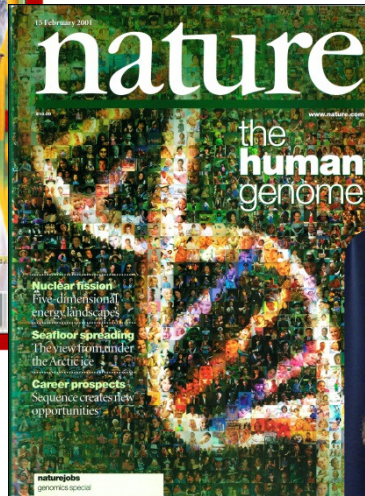
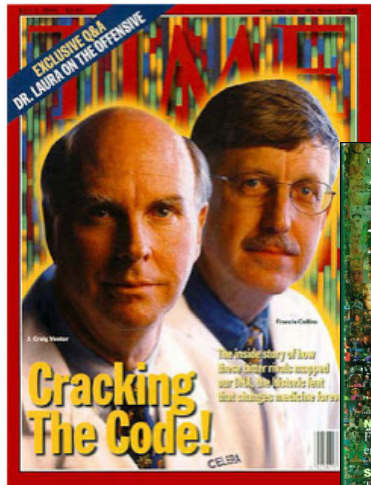


ONE Team . One Africa . One Life

A Rich Heritage in Genomics Leadership



Tech partner for the Human Genome Project



Applied Biosystems 3100
Genetic Analyzer

- 1st draft of the human genetic blueprint unveiled on June 26, 2000
- April 14, 2003, published completion of a finished, reference sequence

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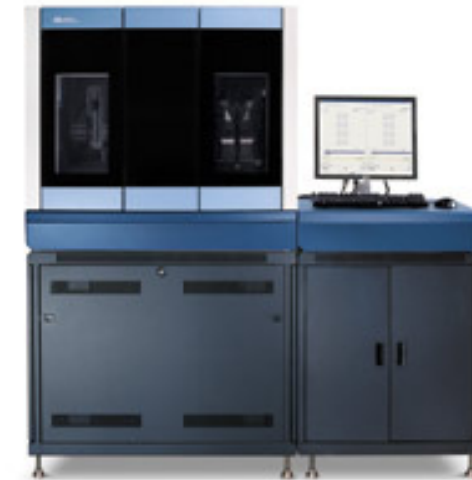
Partnership for African Genomes

Published online 17 February 2010 | *Nature* **463**, 857 (2010) |
doi:10.1038/463857a

News

Africa yields two full human genomes

Sequences show rich diversity among the population.



Applied Biosystems
SOLiD System

- Archbishop Desmond Tutu, the South African civil-rights activist and
- !Gubi, a Namibian hunter-gatherer
- !Gubi hails from the Khoisan community, one of the most ancient and diverse human populations

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Heritage in Genomics Leadership

First Genome Sequenced on the African Continent



Applied Biosystems
SOLiD System

2011 Stellenbosch University: National Research Foundation Grant
SOLiD 5500xl Next Generation Sequencer → Nicknamed MegaMind!

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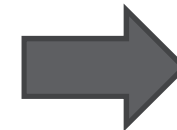
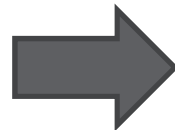
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A Paradigm Change

From individual to population discovery

Individual Based Discovery
Hypothesis driven

Population Based Discovery
Hypothesis free



Primary goal of the Human Genome Project — to discover genetic roots of diseases and then generate treatments — remains largely elusive

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- 1 Disruptive Technology
- 2 End-to-End Solutions

Eliminating Barriers to Population Scale Genomics



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1

Disruptive Technology

Eliminating Barriers to Population Scale Genomics

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In Search of the Right Technology

1. Speed

- Fast TAT- Hours not days
- Long, accurate reads



2. Simplicity



- Eliminate deployment complexity
- Manufacturability & QC

3. Scalability

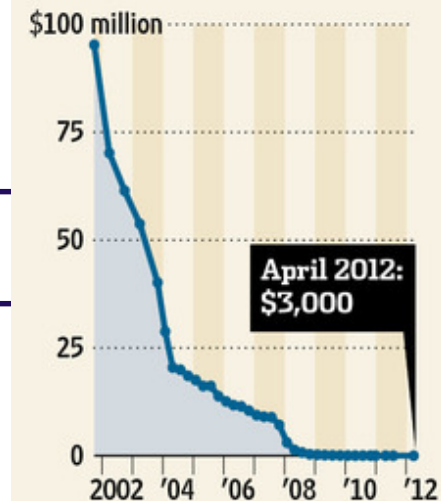


Total Cost of Ownership

- Low Cost Platform
- \$1000 genome roadmap
- Low infrastructure cost

Mass Market

The cost of sequencing per genome



Source: National Human Genome Research Institute

The Wall Street Journal

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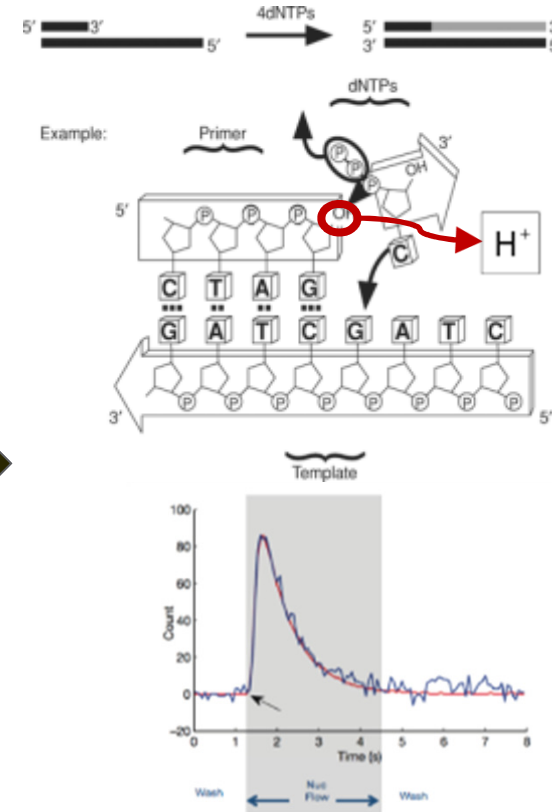
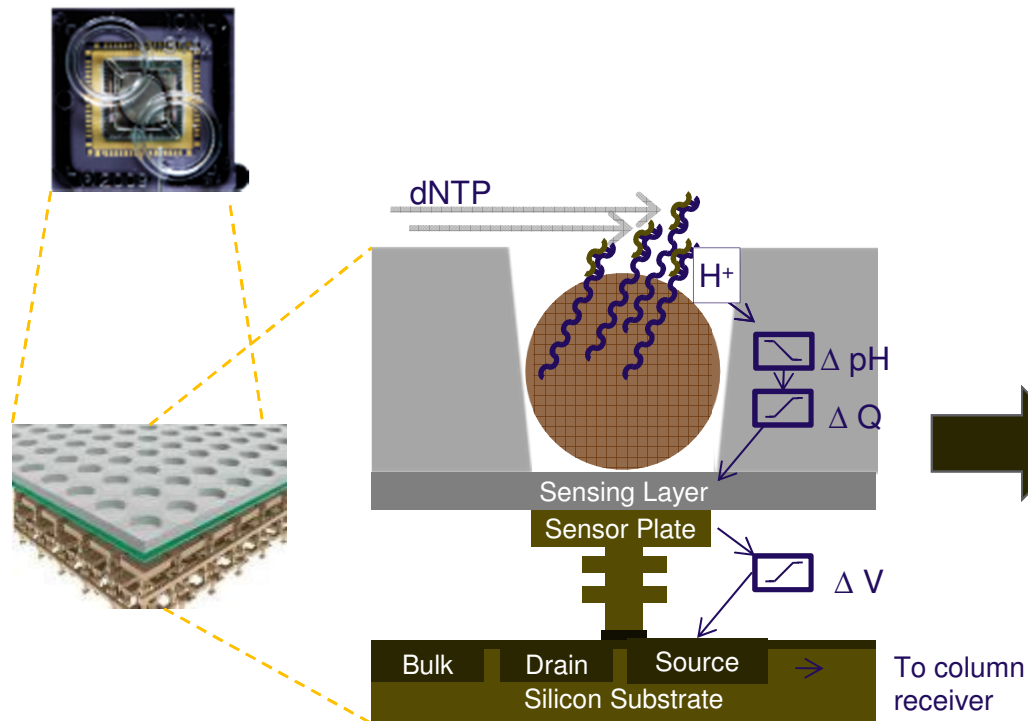
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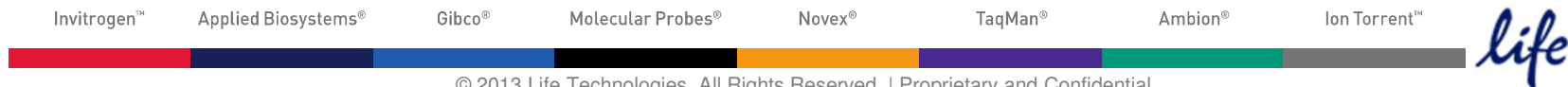
Ion Semiconductor Sequencing



- Direct Detection of Hydrogen Ions and Conversion to an Electrical Signal Read by a Transistor Substrate

Rothberg J.M. *et al*
Nature doi:10.1038/nature10242

**Leveraging the \$3 Trillion semiconductor Industry investment:
 1st Technology to place sequencing on a chip**



Two Hour Human Genomes

Proton
PI Chip

Proton
PII Chip

PI chip 160 M
sensors

PII chip 660 M
sensors

Exomes

\$1000 Genome

Molecular Probes®

Novex®

Semiconductor Sequencing Solutions



1

PGM Simplicity

99.99% accuracy
400 base read length
User-defined flexibility



2

AmpliSeq Speed

PCR targeted gene panels: hours, not days
100% coverage uniformity
10 ng, Single tube, 1000s of amplicons



3

Proton Scalability

PI: 2-Exomes per run, 99.999% accuracy
PII: \$1000 genome
Same day sample to interpretation

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TaqMan®

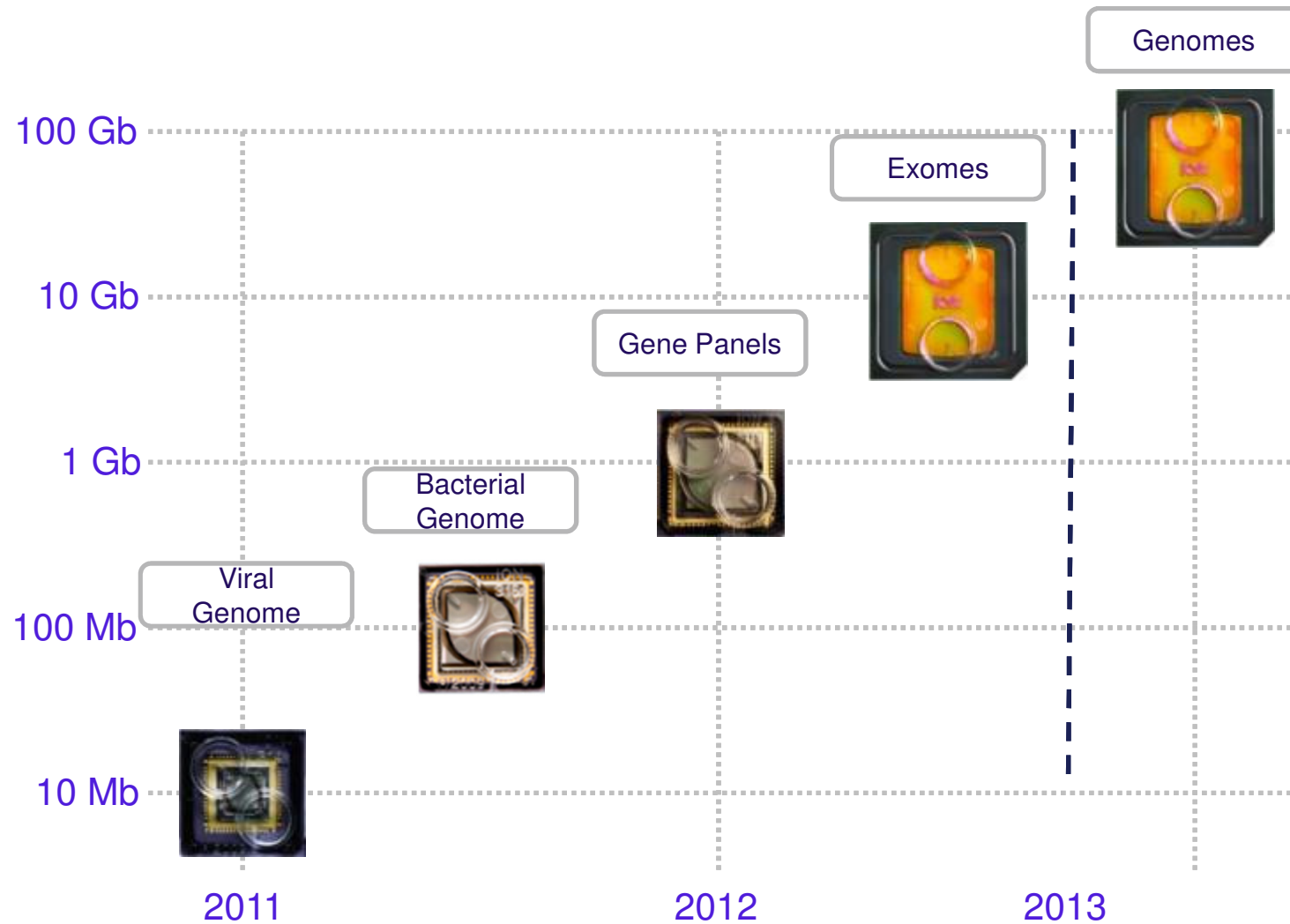
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reserved. | Proprietary and Confidential.

Unprecedented Scalability Launched in 2011



The content provided herein may relate to products that have not been officially released and is subject to change without notice.

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2

End-to-End Solutions

Eliminating Barriers to Population Scale Genomics

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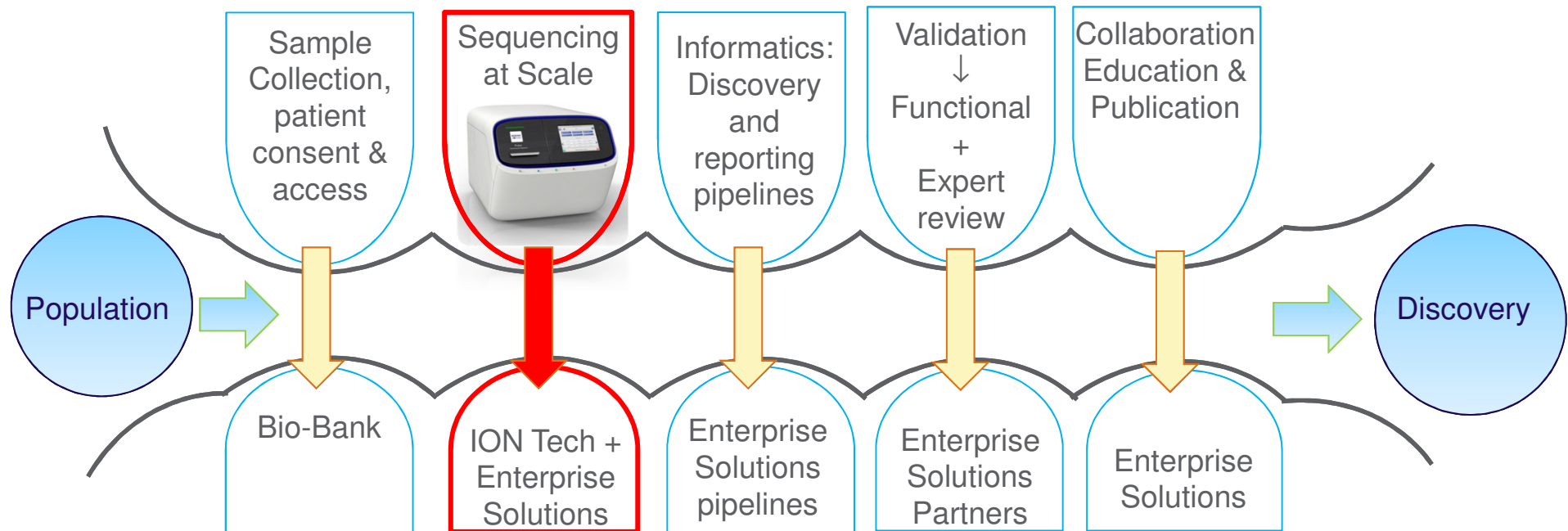
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LIFE Enterprise Solutions

Goal to eliminate critical Bottlenecks to population discovery



- Bottlenecks create barriers that impede the progress
- Life, in collaboration with its network of partners, eliminates bottlenecks

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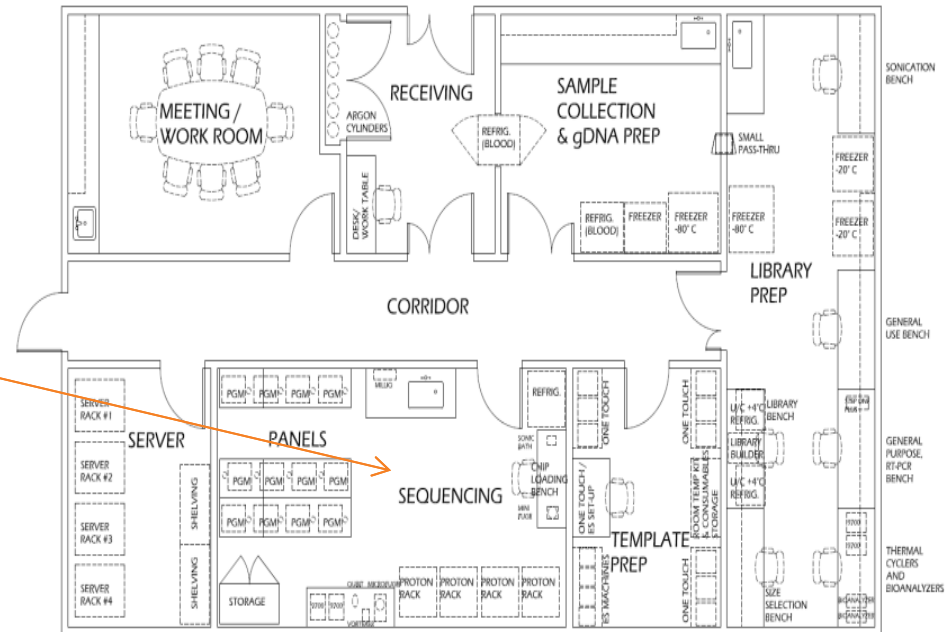
Enterprise *Genomics SmartLab* Concept

Development in partnership with Boston Childrens Hospital,
Harvard's Premier Pediatric Teaching Hospital and No. 1
Pediatrics Hospital in the US.

The Enterprise SmartLab: Turnkey Genomics Lab



Sequencing Factory
4+ Ion Protons



SmartLab Architecture

Value Proposition

- End-to-end Solution (Current Commercial Offering)
- ~2,000 genomes/year capacity
- Less than 5,000 Sq. feet of space allocation

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Enterprise Population Smart *Chip*

Rare Inherited Disease Gene

- Goal: To provide an economical, but comprehensive diagnostic assay for rare inherited disease
- Covers all genetic disease with known causal genes
- A total of over 2000 diseases caused by 3,300 genes
- Based on gross patient symptoms: comprehensive set of 14 major symptom categories, such as vision, hearing, metabolism, etc

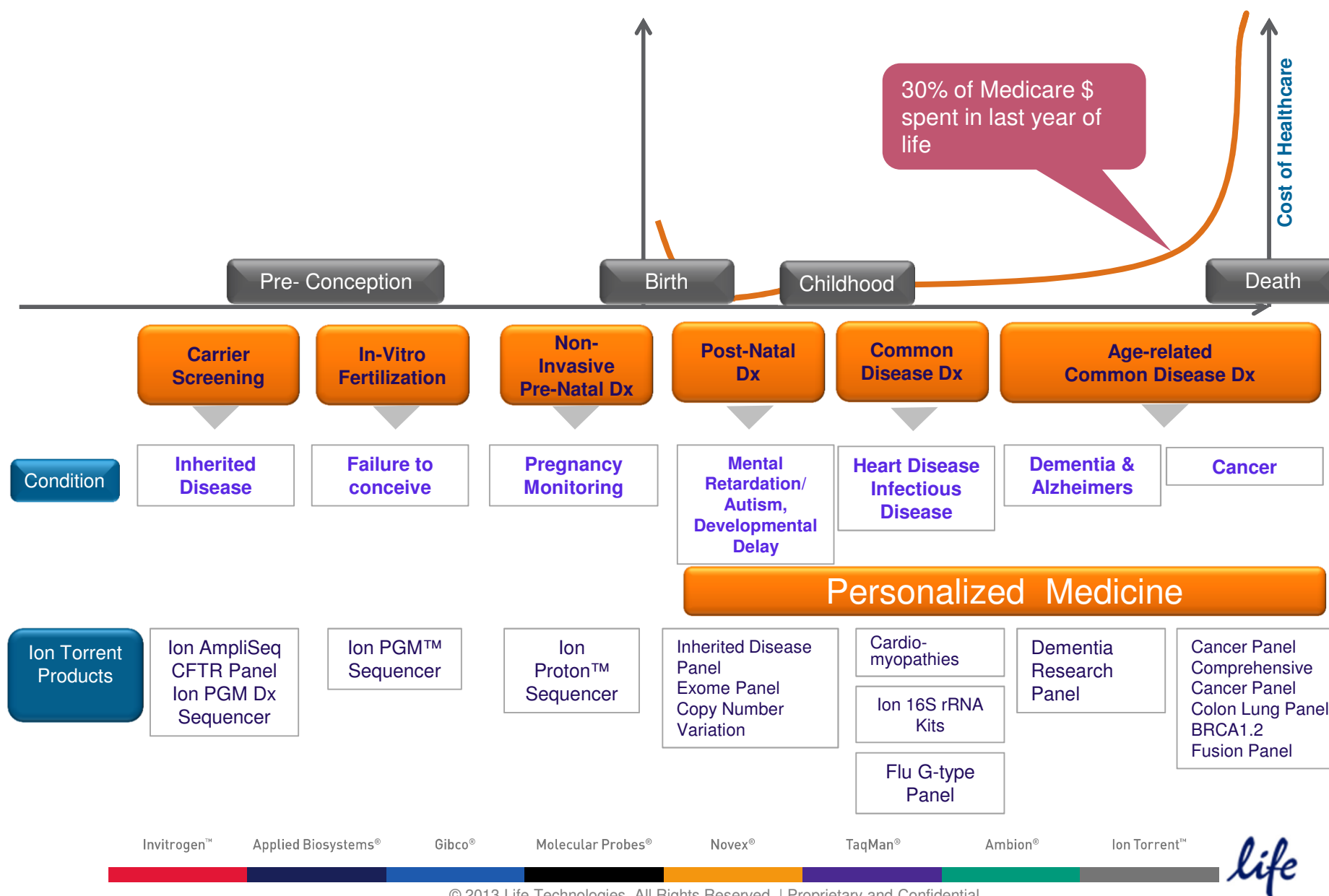
Actionable Cancer

- Goal: Tests to inform patient treatment with current knowledge of cancer genetics
- 129 genes for application to patient tumor samples
- Covers all genes which, if mutated in the patient cancer, indicate some established form of clinical action or therapeutic choice to improve outcome

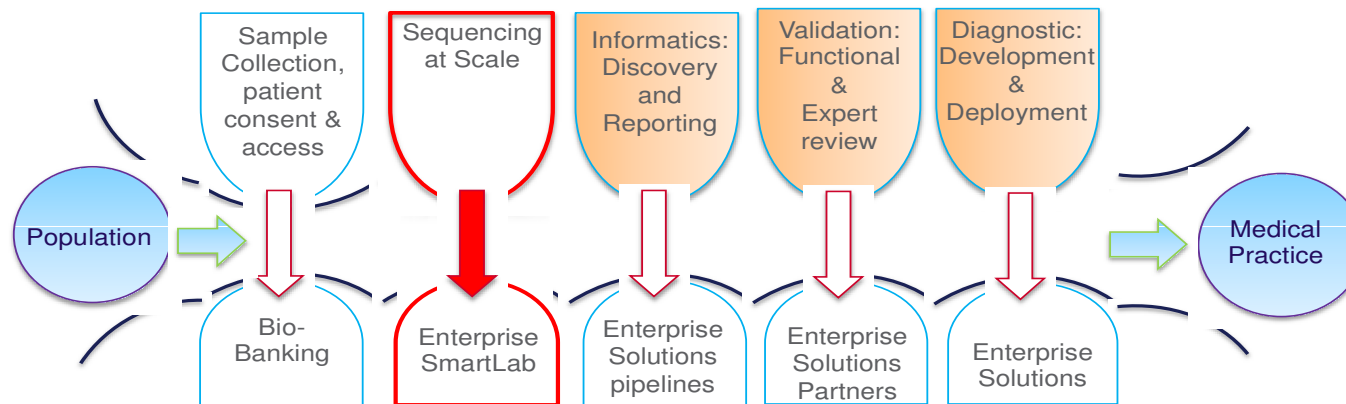
Drug Metabolism

- Goal: Test that provides a comprehensive screen that can be used to give the proper medications and doses, based on the current knowledge of the genetics of drug metabolism.
- 496 genes contains all genes known to have drug metabolism effect, which could impact choice of medication or does for a patient.

Clinical Impact of Ion Torrent Sequencing



Current and In-progress Major National Level Projects



- **Scotland Stratified Medicine Project**

- National project to stratify patients for clinical trials → Lab Infrastructure

- **Genomics England Project**

- Sequence 100,000 patients in NHS → Bidding for Sequencing Labs & Services

- ★ ▪ **US Veteran Affairs (VA) – Million Veterans Project (MVP)**

- Sequence 1M patients in VA Healthcare System → Sequencing Labs & Services

- **Middle East Project**

- National Disease Genetics Discovery → End-to-End solution for population studies

Life Enterprise Genomics
Spectrum



*If you want to fast, go alone,
If you want to go further, go together*
African Proverb

H3 Africa & Life Technologies Proposition for a partnership for success



Thank You!

<i>Ngiyabonga Enkosi</i>	<i>Goed Dankie</i>	<i>Ndatenda</i>
<i>Masvita</i>	<i>Asante sana</i>	
<i>Siyabonga kakulu</i>	<i>Zikomo Kwambiri</i>	<i>N'itumezi</i>
<i>Zikomo</i>	<i>naa goodee</i>	
<i>ee-may-nah eh-sheh-wuh</i>	<i>Merci</i>	<i>barkallao</i>
<i>feek</i>	<i>Ngiyabonga Shukran</i>	<i>Obrigado</i>
<i>Zikomo Kwambiri</i>	<i>kea leboha</i>	<i>Misaotra</i>
<i>may-dah-sayoh-yeh-rah-don</i>	<i>naa goodee</i>	<i>amesege'nallo</i>
	<i>Kea leboga</i>	



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