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# CLASS

## Conference 2014

CloudAssisted Services

## Cloud-computing HPC simulation tools within biopharmaceutical industry

Drago Kuzman, Matjaž Oven

Sandoz Biopharmaceuticals Mengeš

Lek Pharmaceuticals d.d., Slovenia

# Novartis & Google partnership

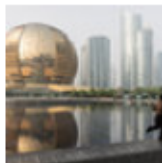
SECTIONS



The New York Times

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DEALBOOK

Alibaba, With Its I.P.O.,  
Mints Millionaires and  
Risk-Takers



DEALBOOK

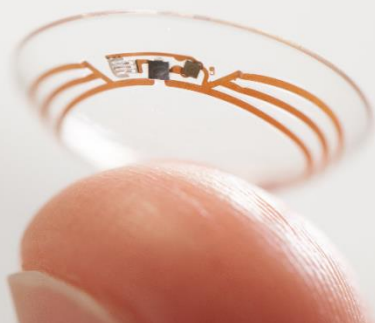
Rush to Invest in Alibaba,  
but Concerns Linger About  
Company's Future



Alibaba's New Campus  
Sets Up for a Big Party

## INTERNATIONAL BUSINESS

# *Novartis Joins With Google to Develop Contact Lens That Monitors Blood Sugar*



...“information about blood sugar levels, which is particularly useful for people with diabetes, could be uploaded to smartphone devices and used by doctors and patients to monitor the data almost in real time“...

<http://www.nytimes.com/2014/07/16/business/international>

# Apple step into Healthcare



The screenshot shows the top section of The New York Times website. At the top left are navigation icons: a hamburger menu, a Twitter icon, and a search icon. The site's name, "The New York Times", is centered in a large, black, serif font. To the right are "SUBSCRIBE" and "LOG IN" buttons. Below the navigation bar are three article teasers. The first is titled "DEALBOOK Latest Updates: Alibaba's Shares Surge 36% at Opening" with a thumbnail of a globe. The second is "DEALBOOK Alibaba, With Its I.P.O., Mints Millionaires and Risk-Takers" with a thumbnail of a modern building. The third is "BUSINESS What Is Alibaba?" with a thumbnail of a house. Below these teasers is a horizontal line, followed by the word "TECHNOLOGY" in bold. The main headline is "At WWDC, Apple Is Set to Make Push Into Monitoring Health and Home" in a large, bold, italicized serif font. Below the headline is the byline "By BRIAN X. CHEN JUNE 1, 2014".

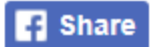
...“The app for mobile devices will track statistics for health or fitness, like a user’s footsteps, heart rate and sleep activity“....

# Mesi Simplifying Diagnostics, Slovenia among top 10 finalists for \$10 M XPRIZE

Home - > Mobile Health - > Qualcomm Tricorder XPRIZE Finalists Announced (Mesi Simplifying Diagnostics)

## Qualcomm Tricorder XPRIZE Finalists Announced (Mesi Simplifying Diagnostics)

Posted in Mobile Health by MDDI Staff on August 27, 2014



### Mesi Simplifying Diagnostics

**Location:** Ljubljana, Slovenia

**Team Leader:** Jakob Susteric, CEO and cofounder of Mesi

“Mesi's wristband continuously monitors patient activity and vital signs, while modules called "shield," "to see," "to hear," and "pee" provide additional information used to make diagnoses. The system aggregates the data in a smartphone app. “



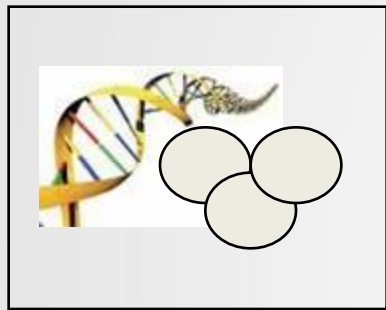
<http://www.mddionline.com/article/qualcomm-names-10-finalists-tricorder-xprize-mesi-simplifying-diagnostics>

# Opportunity for Slovenian pharmaceutical and IT industry

Partners on a project „Cloud-computing HPC simulation tools within biopharmaceutical industry“



# Biologics are more complex than small molecules and are produced from living organisms



**Modify host cells**  
(e.g., bacteria, mammalian yeast) to produce recombinant proteins



**Grow cells**  
under controlled conditions  
(fermentation)



**Extract, refold, purify (downstream)** – generate drug substance



**Formulate to stable finished drug product** (vial, syringe, cartridge)

Biosimilar development costs are **US\$ 800** millions, development time is **8 years**.

# Goal of the project

Goal of the project is an introduction of the latest IT technologies (e.g. high performance computing) into pharmacy in order to:

- shorten development time (e.g. faster scale-ups)
- improve success rate of process transfers (e.g. from pilot to production scale)
- improve production robustness by further process understanding and on-line process monitoring



# Cloud computing and big-data analytics

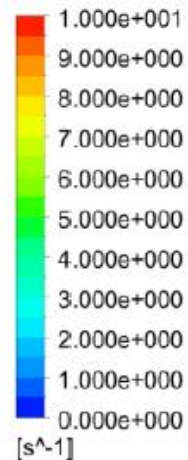
High performance computing in service of bioinformatics is a key factor for the success of the project. Biopharmaceuticals are derived by cell cultures, meaning that the production process understating depends on big data analysis enabling insight into cellular processes.

Analysis will include cluster and cloud computing, big-data analytics, graph theoretical approaches and mechanistical modeling.

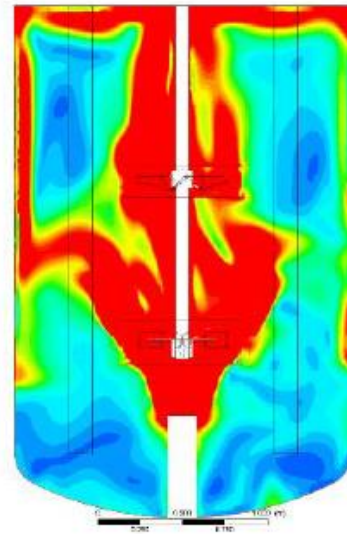


<http://ocw.mit.edu/courses/biology/7-343-network-medicine-using-systems-biology-and-signaling-networks-to-create-novel-cancer-therapeutics-fall-2012/>

Water.Shear Strain Rate  
Contour 1



TurbolInstitut





# Conclusions

Contributions into SPS priorities:

- »Health« priority: faster and cheaper development of biomedicines and their production technologies
- »Smart usage of resources« priority: substantially reduction of the resources (e.g. energy, human, materials) by development of new tools for process development and process monitoring

Developed tools and principles will have also wider applicability for other industries like chemical, environmental and food industries and will enable novel opportunities in IT sector including startups like Mesi!



# Thank You

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