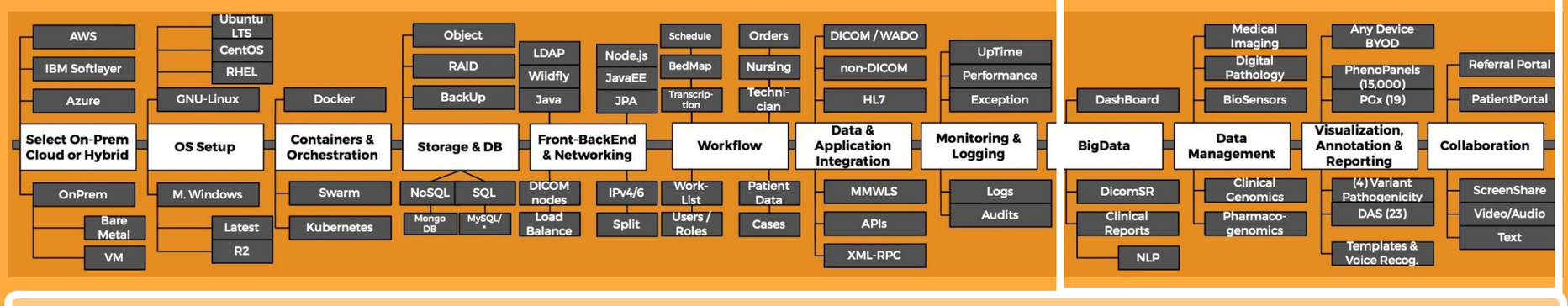
**Jorge Cortell**
CEO, Kanteron Systems

# Data integration and processing of Infectious Disease events

Kanteron Systems has developed a platform that integrates medical imaging (PACS-RIS), digital pathology (WSI), clinical genomics (NGS data analysis workflows), and creates automatic technical reports for precision medicine with fully integrated QC and LIMS procedures. All this patient-centric data can be easily integrated in HIS systems and use HL7 standard protocols.

Once this data is integrated both at a workflow level and at a patient level, it can then form part of larger population health and epidemiologic alert systems for an efficient processing of infectious disease events.

## KANTERON PLATFORM




## DATA INTEGRATION AND PROCESSING

**Dengue burden**[2]**:**

Dengue is the most important arthropod-borne viral diseases in humans with a large global burden. There are an estimated 50 million infections per year across ~ 100 countries in tropical and sub-tropical regions in the world and potential for further spread. It affects ~ 2.5 billion people.

Variable clinical manifestations: from an undifferentiated fever and dengue fever to the more severe Dengue Hemorrhagic Fever (DHF) and Dengue Shock Syndrome (DSS).

With the absence of licensed vaccines or specific antiviral therapies for dengue, patient management relies on good supportive care. Prompt and early diagnosis of dengue viral infection remains crucial. Laboratory confirmation is important due to difficulties in making accurate diagnosis due to the broad spectrum of clinical presentations.

**Example screening / diagnosis for Dengue (DENV):**

Clinical disease onsets 4-6 days after infective mosquito bite. Early and proper diagnosis can reduce symptoms and prevents complication and death.

1. Minutes: NS1 Ag rapid test
2. 1 day: Portable genome sequencing to screen or investigate reported virus transmission (example: Angola[1]) allows for early detection (HIA, FAT, NSI/MAC-ELISA, IgM and/or IgG, RT-PCR...)
3. 2-5 days: Immunohistochemistry (digital pathology)
4. 1 week: Virus isolation (mosquito cell line culture with patient serum)

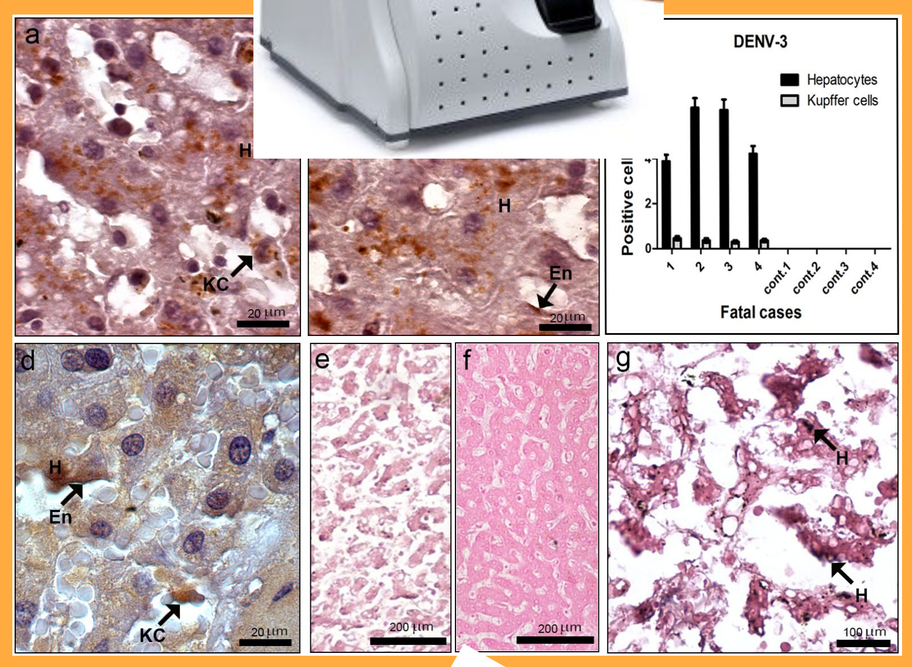
In the future: micro/paper fluidics, in vivo micropatches, isothermal PCR, electrochemical and piezoelectric...

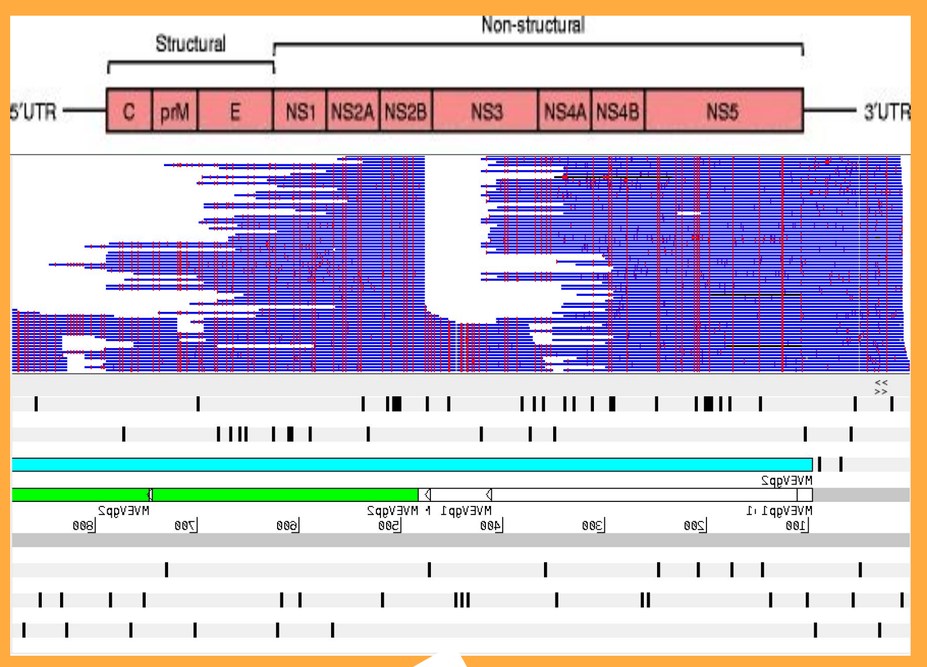
**Digital Pathology** (immunochemistry) [4]**:**

(a–b) Detection of DENV-3 antigens in general in hepatocytes (H), Kupffer cells (KC) and endothelium (En). (c) Quantification of hepatocytes and Kupffer cells presenting dengue antigens. (d) Detection of dengue NS3 protein in hepatocytes (H), Kupffer cells (KC) and endothelium (En). (e–g) Detection of DENV-3 RNA negative strand by in situ hybridization. (f) One non-dengue case incubated with the probe. Arrows indicate positive staining in hepatocytes (H).

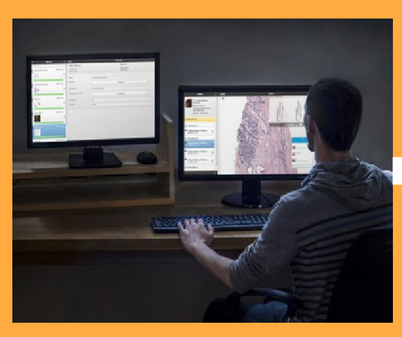
**Genomics** [3]**:**

The ~10.7 kb DENV genome encodes three structural proteins (capsid [C], premembrane [prM], and envelope [E]) and seven non-structural (NS) proteins (NS1, NS2A, NS2B, NS3, NS4A, NS4B, and NS5). UTR untranslated region.

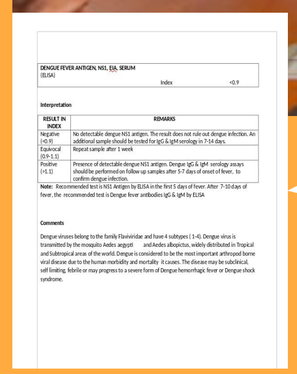


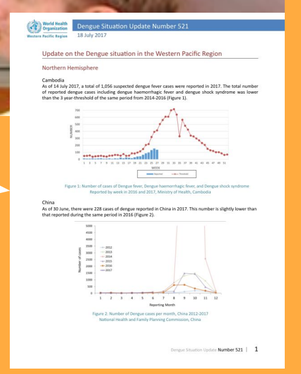




## STORE, INTEGRATE, ANALYZE, VISUALIZE




## COLLABORATE, ANNOTATE, REPORT, INTEGRATE, VISUALIZE




## Summary

The integration of medical imaging, digital pathology, and clinical genomics can accelerate time to diagnosis, facilitate interdisciplinary team care management, and enable multi-omic analysis at scale, both patient-centric and population-wide.

Here we present an enterprise platform for the ingestion, normalization, analysis, reporting, and sharing of all clinical data.

This platform is vendor-neutral, zero-footprint, and browser-based. Additionally, the ability to handle data in any language, and almost any format, makes it ideal for deployment in large hospital-clinic networks, remote locations, and international collaboration initiatives.

Our clinical data integration and workflow solution has been leveraged for machine learning / AI, big data analytics, NLP, and precision medicine, in 12 countries and 80 million patients, by public and private institutions as relevant as the NHS (UK), EsSalud (Peru), IMSS-iSSSTE (Mexico), MHS (USA), Seguridad Social (Spain), CGI (Canada), AMC (Ethiopia), HUSI (Colombia), or ITMS (Chile).

## References

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