COVID-19 and the ‘new normal’

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2020-05-15
The ‘new normal’ transforms the future into present. Our present is, now, past and will never comeback.
Challenges

Pandemic and healthcare
Brazil’s scenario

Brazil is a **continental** country with **federated states**, 209M population and **different conditions** in each state.
COVID in Brazil

NOTIFICATIONS
Brazil has fewer physicians per person than most developed countries

Physicians
Per thousand inhabitants

Source: OECD 2017 - McKinsey & Company
Health facilities, by use of electronic health records - 2017

- **Total**: 21Electronic Health Record, 24Part in paper, 53Only paper
- **Public**: 11Electronic Health Record, 39Part in paper, 49Only paper
- **Private**: 30Electronic Health Record, 11Part in paper, 56Only paper
- **Hospitals with no beds**: 21Electronic Health Record, 27Part in paper, 50Only paper
- **Hospitals between 1 and 50 beds**: 4Electronic Health Record, 34Part in paper, 62Only paper
- **Hospitals with more than 50 beds**: 6Electronic Health Record, 16Part in paper, 77Only paper
- **Diagnosis and therapy service**: 33Electronic Health Record, 5Part in paper, 60Only paper
5 Bi
RECORDS/YEAR

50K+
LABS

8K+
HOSPITALS

SOURCE: BRAZILIANS MINISTRY OF HEALTH
Interoperability and silos

Distributed Timeline and federated clinical documents
Patterns and guidelines

INTEROPERABILITY
NEW STANDARDS

Medical Standards
SNOMED-CT, TISS, DICOM, LOINC, ISBT 128, CID, CIAP-2, TUSS, CBHPM.

Architectural guidelines
FHIR - RES
REST (Communication)
JSON (Document)

Interoperability Standards
HL7 FHIR - Integration

Standard patient data
IHE PIX
Deepfake
POST TRUTH ERA
FIGHTING AGAINST COVID-19

Citizens: Diagnosis and information

Test population, notify and monitor cases and beds

Empower practitioners
Coronavirus SUS
Diagnosis App/PWA
Chatbot
Calling robot
Coronavirus SUS

CITIZENS
COVID Case’s Notification

NOTIFY, TEST AND MONITOR
Notifica SUS

MONITOR CASES AND BEDS
### Dashboard

**CASES AND RESOURCES**

<table>
<thead>
<tr>
<th>Estado</th>
<th>Municipio</th>
<th>CNES</th>
<th>DATA</th>
<th>Ocupação Hospitalar</th>
<th>Ocupação Brasil (COVID-19)</th>
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**Observações**

- CLI: Cama leito hospitalar
- UTI: Unidade de Terapia Intensiva

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*Image showing a dashboard interface with data tables and charts.*
Test Strategy

50K Labs + 42M tests (Phase one)
ConecteSUS
COVID'S EXAM
RESULT + TIMELINE
Blockchain

Shared Timeline
Private Data Collection and GDPR*

Patient consent access to his data in Smart Contract
Performance

2000 TPS (read and write) on AWS Cloud
RAFT Consensus (5 nodes)
Timeline channel and Log channel
3 private data collections
CouchDB
FHIR Standard

Services ready for packaging messages in Brazilian standard
Integration

FHIR APIs and HL7, OpenEHR and CDA converters
After the Pandemic

‘NEW NORMAL’: ARE WE PREPARED?
Blockchain + AI

Intelligent patient summary, Prognosis, Drug recommendation, …
Patient’s summary

USING AI WITH BLOCKCHAIN'S TIMELINE
Graphs + AI

EXPOSURE NOTIFICATION API AND FHIR’S TIMELINE GRAPH
Rethinking Healthcare

Telemedicine, rapid tests, new approach on hospitals,…
E-Patient

The patient as CEO of his own health
Preventive medicine

Health risk analysis through AI
Enhanced timeline data (Wearables, IoT...)
Longevity escape velocity

HEALTH MAINTENANCE: PROGNOSIS + PREVENTION + HEALTH MANAGER
ARTIFICIAL INTELLIGENCE

IOT/WEARABLES

BIOTECH

GENOMICS
Thank you!

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