



apidays
LIVE
HONG KONG
2021

APIs in Healthcare

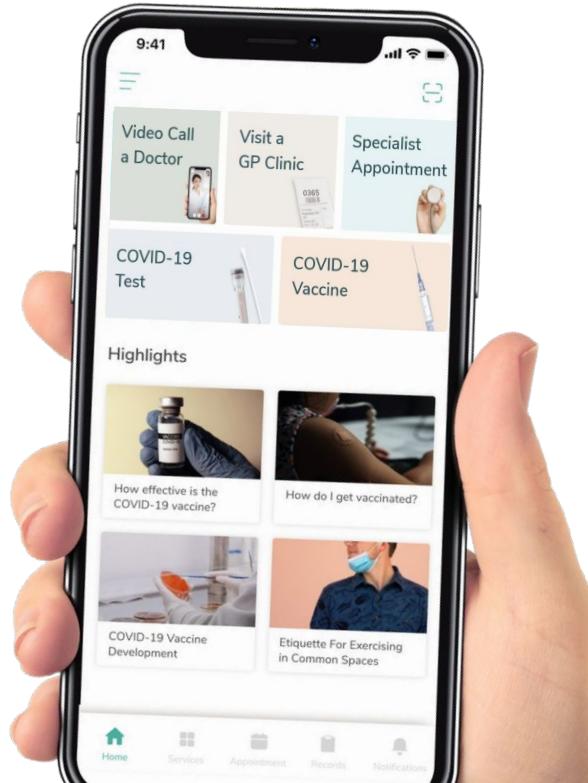
Tales from the Field



Uli Hitzel
Chief Architect | Care

Let's Fast Forward to 2022

- Video Call a Doctor
- Queue Numbers for Clinic Visit
- Specialist Appointment
- **Covid19 Tests & Vaccination**





CARE | COVID-19 TEST

Landing screen

5:18

COVID-19 Test

FAQ ⓘ

Book a Test

For Travel

For General Testing

Redeem My Test

Enter referral code

>

View My Tests >

Test results may take > 24 hours to be ready after test administration.

By proceeding, I agree to the [Terms of Use](#) and consent to the collection and use of my information for COVID-19 contact-tracing.

Select test type

5:18

Test Type

PCR Nasal Swab Test

PCR Nasal Swab Test
View Details

A long nasal swab will be inserted into the nostril to collect fluid from the back of the nose. Swabbing will be done by a healthcare professional.

Serology (IgM) Test

Serology (IgM) Test
View Details

A sample of blood will be taken for this test. Blood sample collection will be done by a healthcare professional.

Available in Hong Kong only

PCR Deep Throat Saliva Test

PCR Deep Throat Saliva Test
View Details

Available in Hong Kong only. A saliva sample will be drawn out from deep within the throat and spat into a specimen bottle. Saliva sample collection can be self-administered.

Next

Optimized clinic search by proximity, country or keyword

5:18

Preferred Clinic

Search

Clinics Near You

Raffles Medical - Shaw Centre Orchard

1 Scotts Road, #04-09 to 14, Shaw Centre S228208

Raffles Medical - Bedok North Blk 203

Blk 203 Bedok North Street 1, #01-467 S460203

Raffles Medical - Marina Bay Financial Centre

12 Marina Boulevard #17-05, Marina Bay Financial Centre Tower 3 S018982

Raffles Medical - Raffles Hospital

585 North Bridge Road #02-00 S188770

Raffles Medical - Changi Airport

Select date & time

5:18

Appointment Date & Time

Select Date

09 July 2020

Select Time Slot

Time Zone: Asia / Singapore

07:00	08:00
09:00	17:00
18:00	19:00

09 July 2020 | 07:00

Raffles Medical - Changi Airport Terminal 3

Next



CARE | COVID-19 TEST

Confirm personal information

5:18

< Personal Information

Name (as in Passport)
John Doe

Code Mobile Number
+65 91234567

ID Type & Number
Passport
S7512345A

Nationality
Singapore

Gender
Male

Date of Birth
3 Sep 1975

Email
johndoe@email.com

Next

Make payment

5:18

< Select Payment Method

E-Wallet (Balance \$0.00)

Credit / Debit Card

WeChat Pay

PROMO123 Remove **Apply**

Promo Code: -S\$100.00

Total Amount: **S\$100.00**

Confirm Payment

Receive QR code and appt reminder

5:18

< Upcoming Test

Case ID: 12341451359-345093454-5342345

Please show this QR code at the clinic for registration.

Personal Information
Alex Lim
Passport Number K00000123N
Mobile Number +65 91234567

Test Appointment
20 July 2020, 07:00
Raffles Medical - Raffles Hospital
585 North Bridge Road S188770
+65 6311 2222

Order Details
Date: 2020-06-28
Description

QR scan in-clinic for fuss-free patient registration



CARE | COVID-19 DIGITAL CERTIFICATE

Test Result

A screenshot of a mobile application titled "Test Result". The main header says "COVID-19 Negative" with a checkmark icon. Below it, the case ID is 12345678, the date is 20 July 2020, 07:30am, and the type is COVID-19 PCR Test. A "TIME ELAPSED" section shows 00 years, 00 months, 23 days, 12 hours, and 00 mins. The issuer is "Raffles Diagnostica". A "Universal Certificate" section asks "Why do I need it?" and shows a dropdown for "Purchase certification for: Singapore". At the bottom is a QR code.

Digital Certificate & Memo

A screenshot of the Accredify platform. It displays a message: "The uploaded certificate is verified". Below this, detailed certificate information is shown in two columns:

Certificate Name	SWAB Test Result
Issuer	Raffles Medical Group
Certificate Store	0x77cad17e9880d38e6f81d52ff0385b03a3f8a97d
Merkle Root	0x4fe7ad36eec97d5cf57cc5d0de1b092b54394bd670e95ea9fcddf09a22d062e
Certificate Hash	0xd53ceb4e7e732f8bb56489b08db5a8d021424aedf234509268c680dd940f7dd

To the right, a "Check" table lists four status items with green checkmarks:

Check	Status
Has not been tampered with	✓
Has been issued	✓
Issued by registered institution	✓
Is valid	✓

Below this is a "Certificate Preview" section with the Raffles Medical Group logo and the title "MEMO ON COVID-19 REAL TIME RT-PCR SWAB TEST RESULT". A red arrow points from the QR code on the left towards this preview area.



Chief Architect



NUS Fellow



/in/uhitzel



/u1i



11:15 AM

Projects

- [Yoisho Open Banking Project](#)
- [Bambleweeny](#): A lightweight key-value store and message broker based on HTTP/REST
- [keiju](#) - Minimalist API Gateway in a ~25 MB Container.
- [samsa](#) converts between OpenAPI v2 and v3 formats (YAML/JSON)
- [majime](#) – Dead Simple API Unit Testing

Speaking Engagements – Slides

- [Redis Meetup Singapore](#) (April 2018)
- [PyCon Bangkok](#) (June 2018)
- [Stripe - API for Humans](#) (March 2019)
- [RedisConf San Francisco](#) (April 2019)

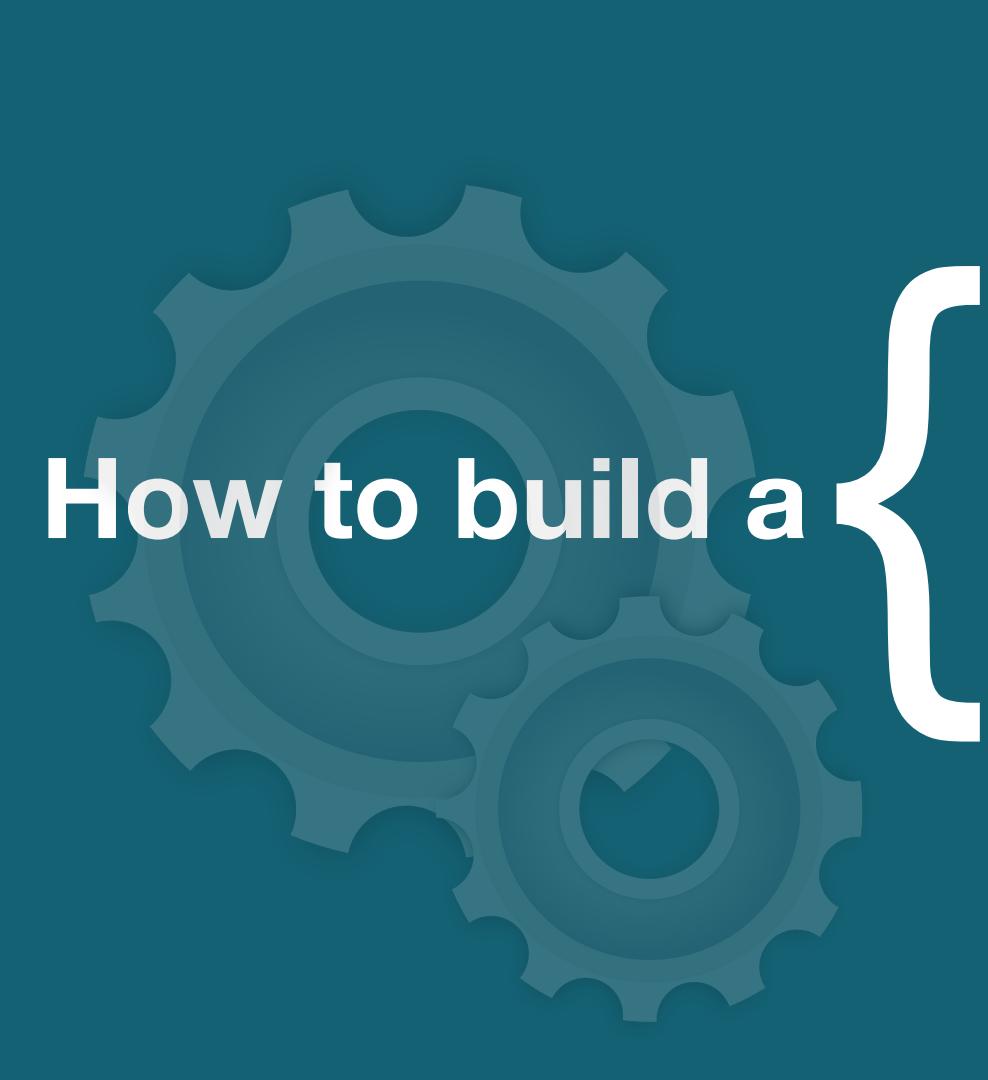
<https://apigeek.net>



majime



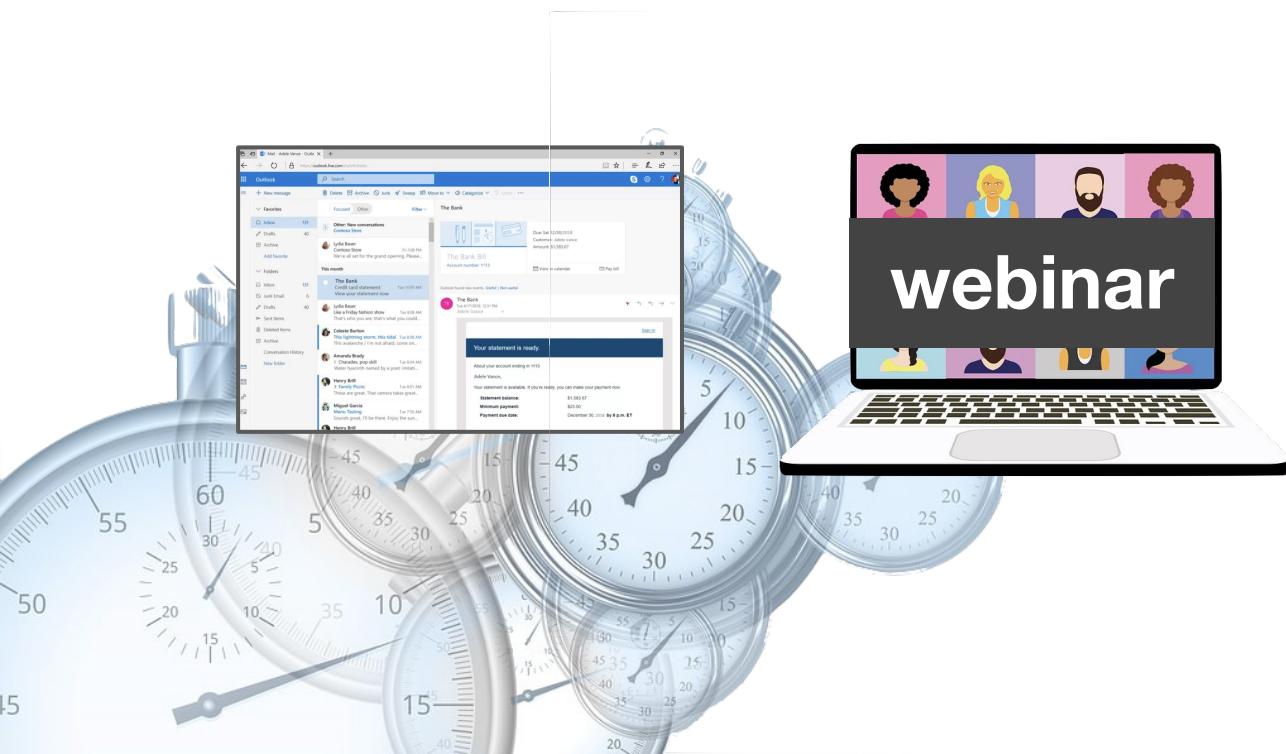
bamble
weeny



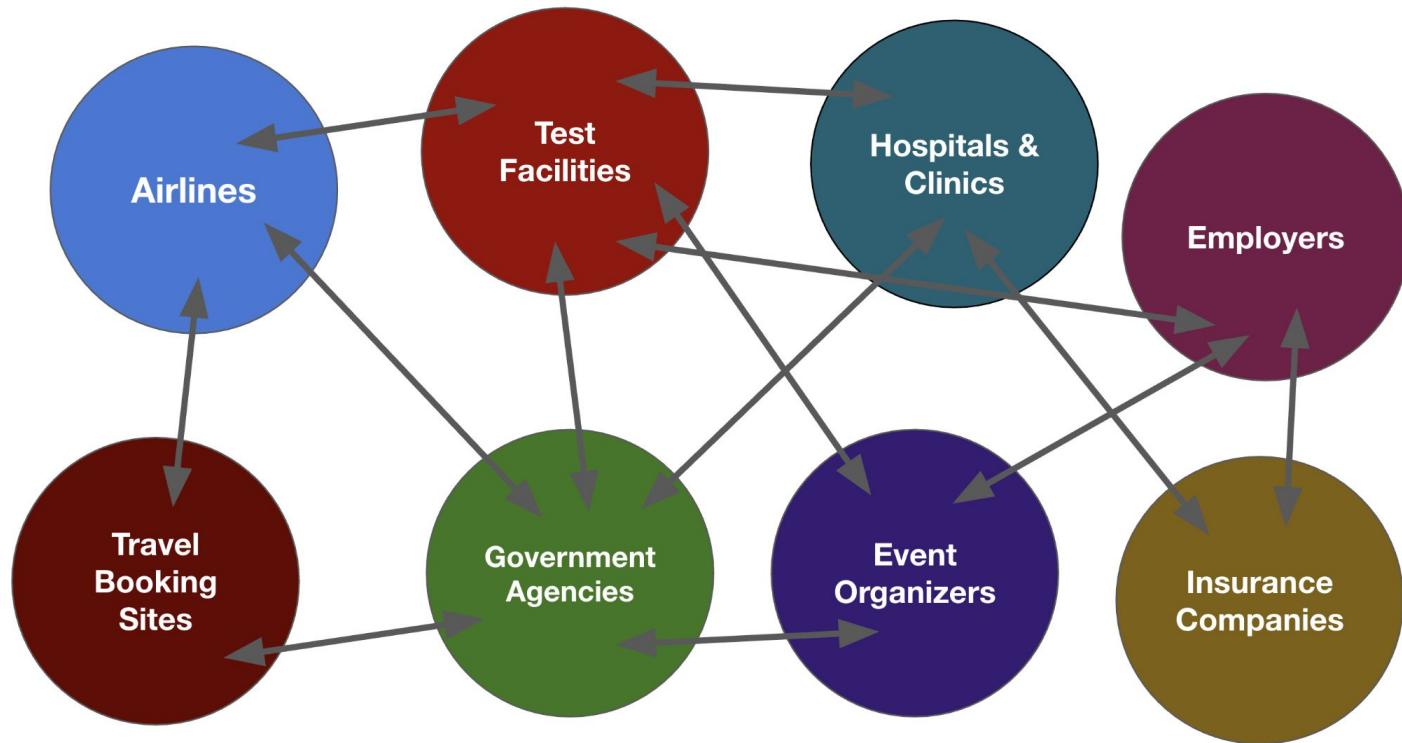
How to build a

platform
company
ecosystem

Things Are Different On The Other Side



Data Integration Challenges



Observations



Fragmented and Archaic systems

The lack of digitization in healthcare results in a disconnected, frustrating experience for the patient.

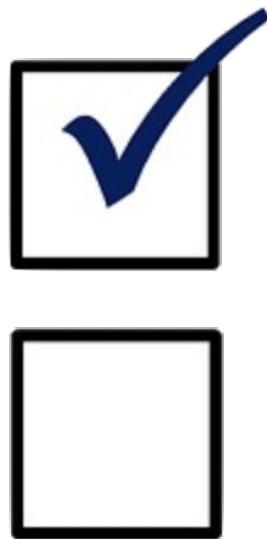


Different Providers, Different Philosophies, Different Standards

Patients face an opaque system with high knowledge asymmetry when trying to find appropriate care.



When is an API... an API?



- **HTTP + JSON**
- **Proper HTTP Verbs**
- **Understand the API in 10 Minutes**

Observations



Patients Don't Own Medical Data

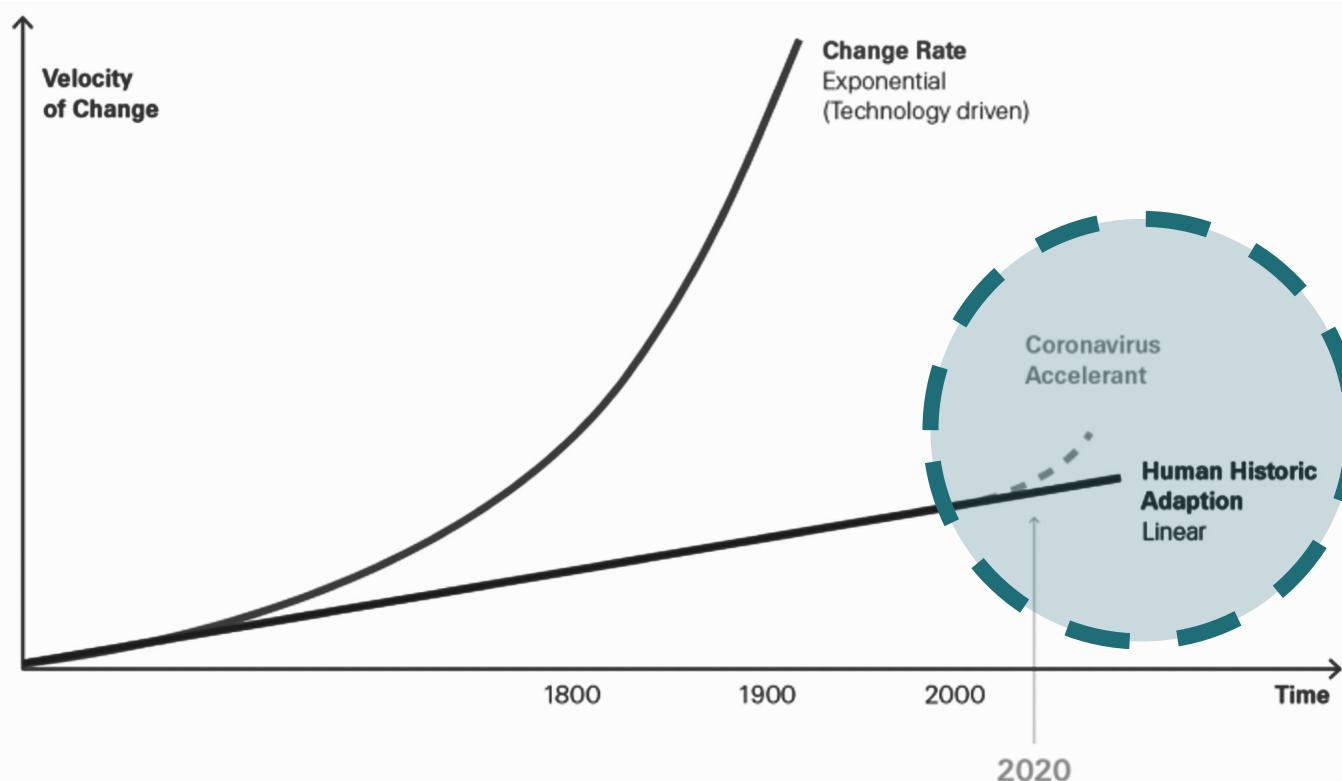
A patient's data is scattered across pieces of paper, or in fragmented hospital databases.



Aging Population

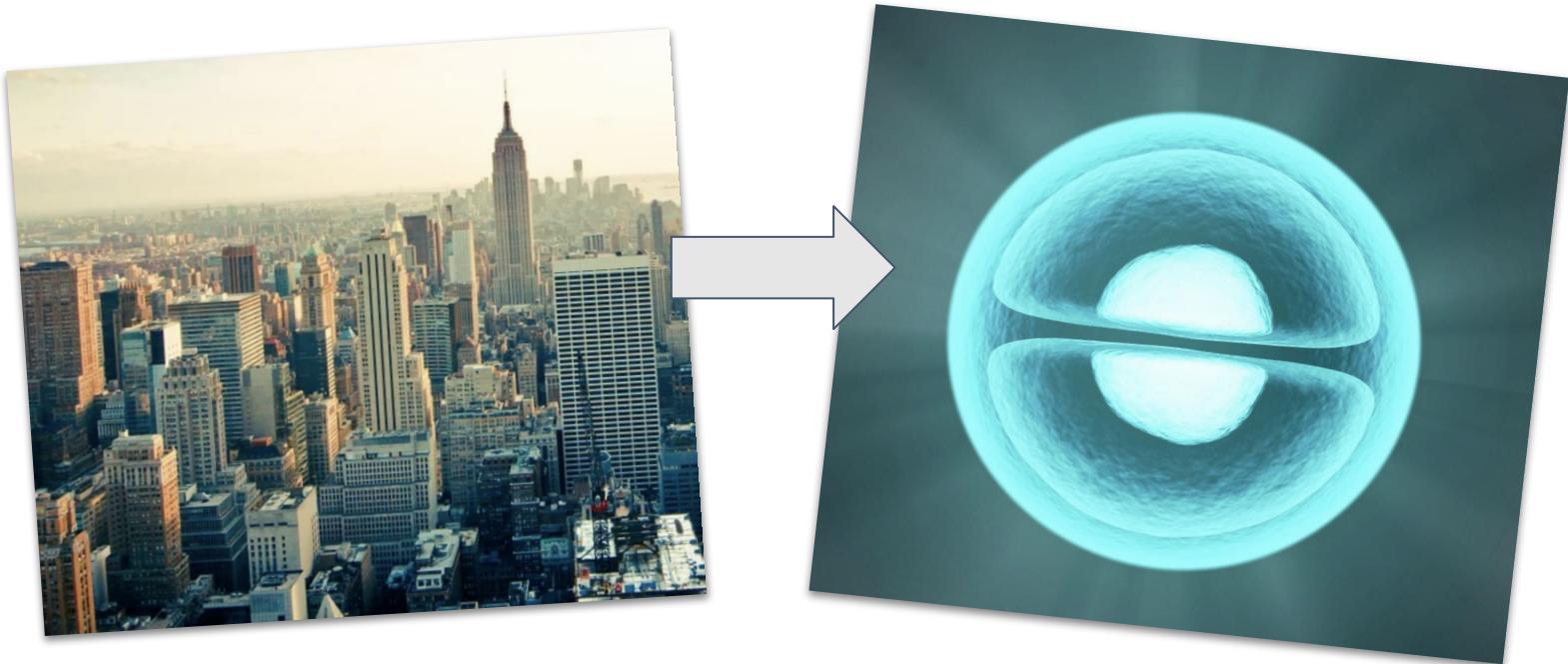
The long-term needs of an aging population require the healthcare system to operate efficiently and effectively.

Covid-19 Impact on Technology vs Human Adoption Rate

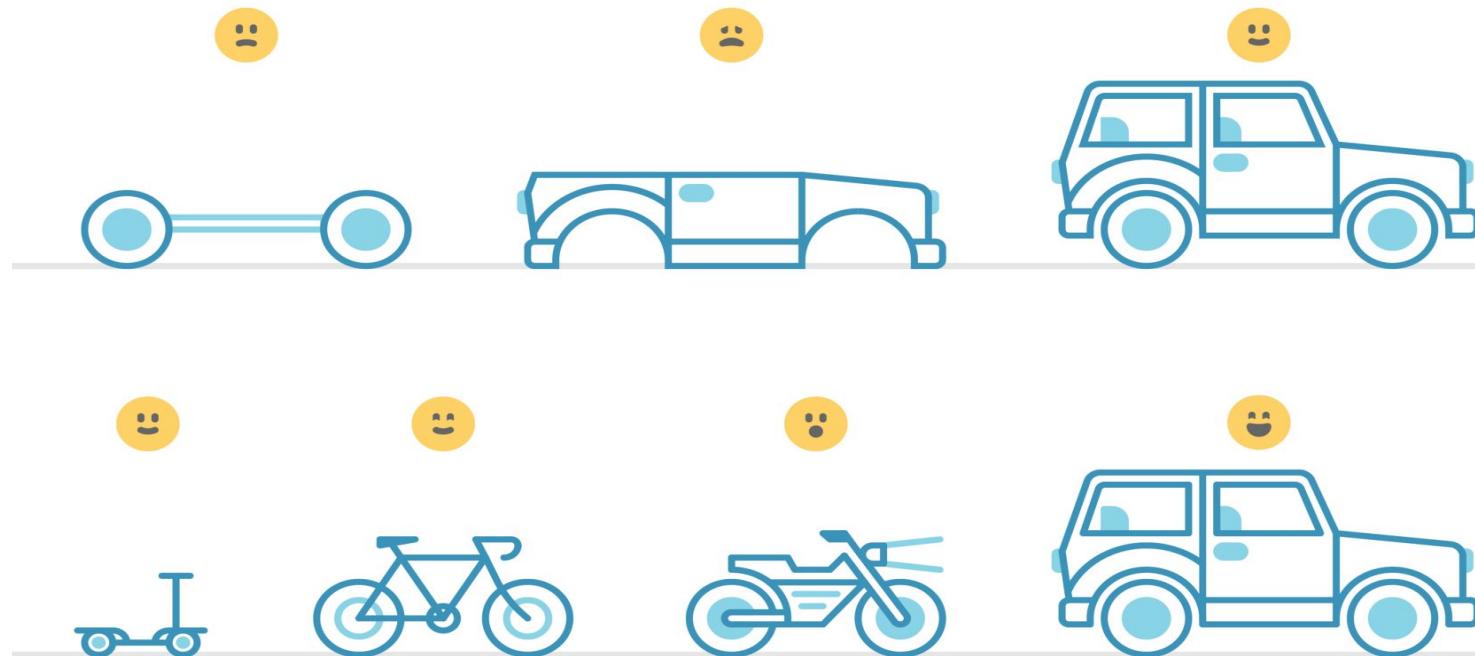


Source: Source; Heather E. McGowan (23.05.2020) How The Coronavirus Pandemic Is Accelerating The Future Of Work. Forbes

1 – Design for Change



2 – Iterate Fast



3 – The Need For Interoperability

INTEGRATION & INTEROPERABILITY NEWS

API Adoption Slow, Widespread FHIR Uptake Expected by 2024

Although API adoption is limited, survey respondents predicted widespread Fast Healthcare Interoperability Resources (FHIR) API adoption by 2024.



<https://ehrintelligence.com/news/api-adoption-slow-widespread-fhir-uptake-expected-by-2024>

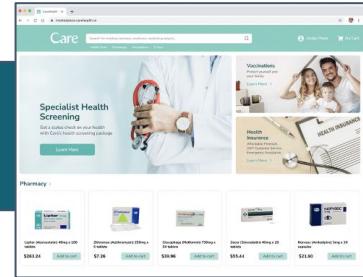
What We Are Building

Patients

{api}



Providers



Care

Payers

Strategic Partnership



SINGAPORE



SHANGHAI



CHONGQING



BEIJING

14	5	~500
Cities	Countries	Doctors
4	100	~300
Hospitals	Clinics	Panel Doctors
~250	~10,000	90
Products	Medicines	Panel Clinics

Raffles
MedicalGroup

In The Making: Partner APIs

The screenshot shows a web-based API documentation interface for a service named 'Care'. The left sidebar contains navigation links: Search, Introduction, Authentication, Covid-19 Test Products, Test Facilities & Available Slots, Referral Codes, Book a Covid-19 Test (selected), and Errors. Below these are links to Sign Up for a Developer Key, Open API Specification, and Swagger Editor – Open API Specific... . The main content area has a title 'Book a Covid-19 Test' and a subtitle 'Book a Covid-19 Test Appointment (Preview)'. It describes booking a Covid-19 Test at a facility. Below this is an 'HTTP Request' section showing a POST /appointment endpoint. The 'Request Body (JSON)' section contains a table with parameters: clinicCode (required, yes), appointmentSlotId (required, yes), testTime (required, yes), name (required, yes), and idType (required, yes). The 'clinicCode' row has a note about valid values like "CovidTest_Clinic SG". The 'appointmentSlotId' row has a note about valid slot IDs like "RMG_9361621". The 'testTime' row has a note about valid dates like "2020-12-11T09:45:00.000Z". The 'name' row has a note about valid names like "John Wang". The 'idType' row has a note about valid types: NRIC, PASSPORT, FIN, and HKID. To the right, a terminal window titled 'shell' shows a curl command to post JSON data to the API endpoint. The JSON data includes fields like clinicCode, appointmentSlotId, testTime, name, idType, idNumber, nationality, gender, mobileNumber, email, dateOfBirth, timeZone, prepaid, and bizId. Below the command, a note states: 'The above command returns JSON structured like this:' followed by a partial JSON response starting with [{ "status": "success" }].

```
curl -X 'POST' \
  'https://api-sandbox01.carehealth.io/v1/covid19-test/appointment' \
  -H 'accept: application/json' \
  -H 'apikey: XXXX' \
  -d '{
    "clinicCode": "CovidTest_Clinic_SG",
    "appointmentSlotId": "RMG_9361621",
    "testTime": "2020-12-11T09:45:00.000Z",
    "name": "John Doe",
    "idType": "PASSPORT",
    "idNumber": "X918277H",
    "nationality": "SG",
    "gender": "male",
    "mobileNumber": "+658123456",
    "email": "johndoe@gmail.com",
    "dateOfBirth": "1962-08-05T00:00:00.000Z",
    "timeZone": "Asia/Singapore",
    "prepaid": "true",
    "bizId": "SM29X"
}'
```

The above command returns JSON structured like this:

```
[  
{  
  "status": "success"  
}]
```

Your Turn!

- **We're hiring:** Singapore & Vietnam
- **LinkedIn:** Let's connect and see if we can team up
- **Don't panic!**: Things are going to get better. We're on it!

