

How OpenJaw builds software



OpenJaw

A TravelSky Company

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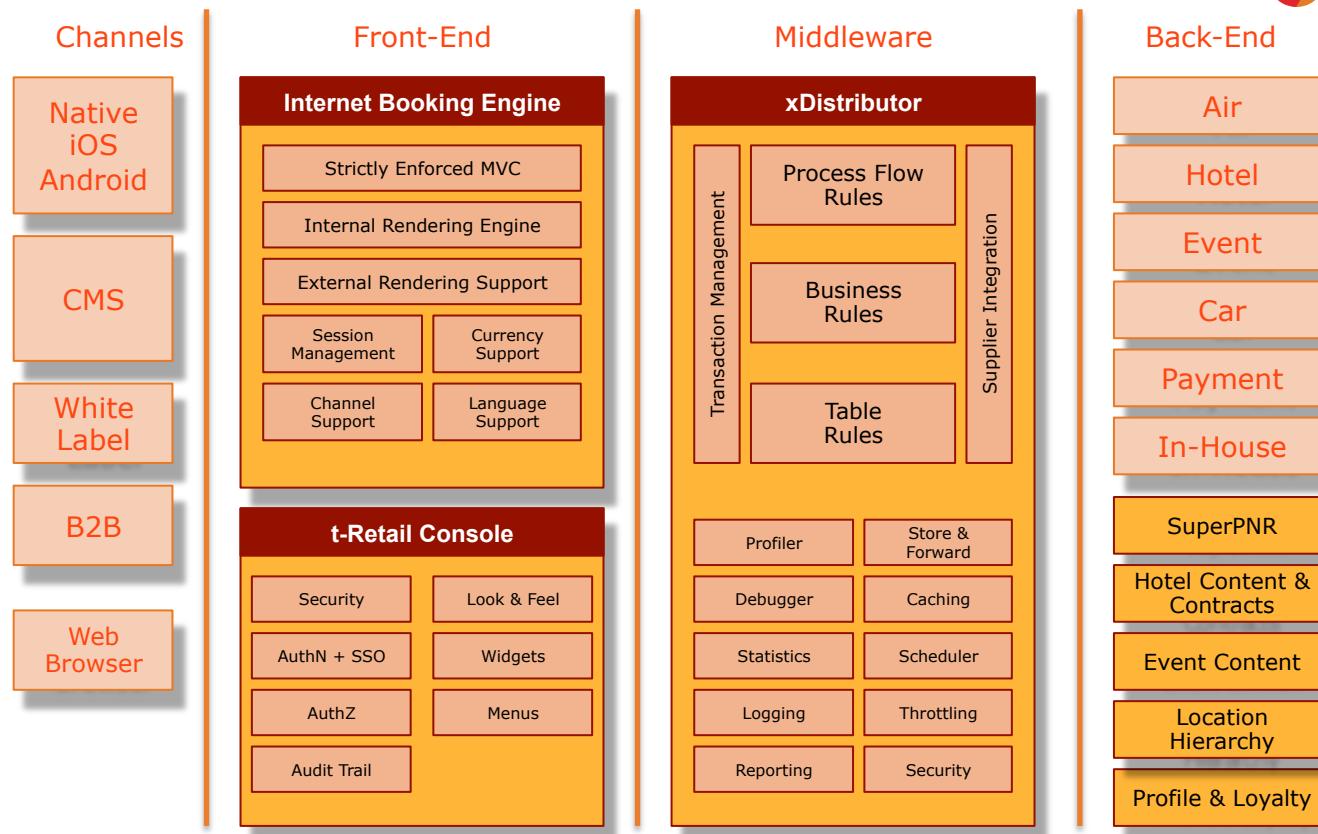


TravelSky, the dominant IT provider to China's Travel Industry



- ✓ Listed on the HK Stock Exchange
- ✓ 6,000 employees
- ✓ 161bn transactions annually
- ✓ 470m passengers annually
- ✓ 105 airlines, 300 airports

Architecture: Framework





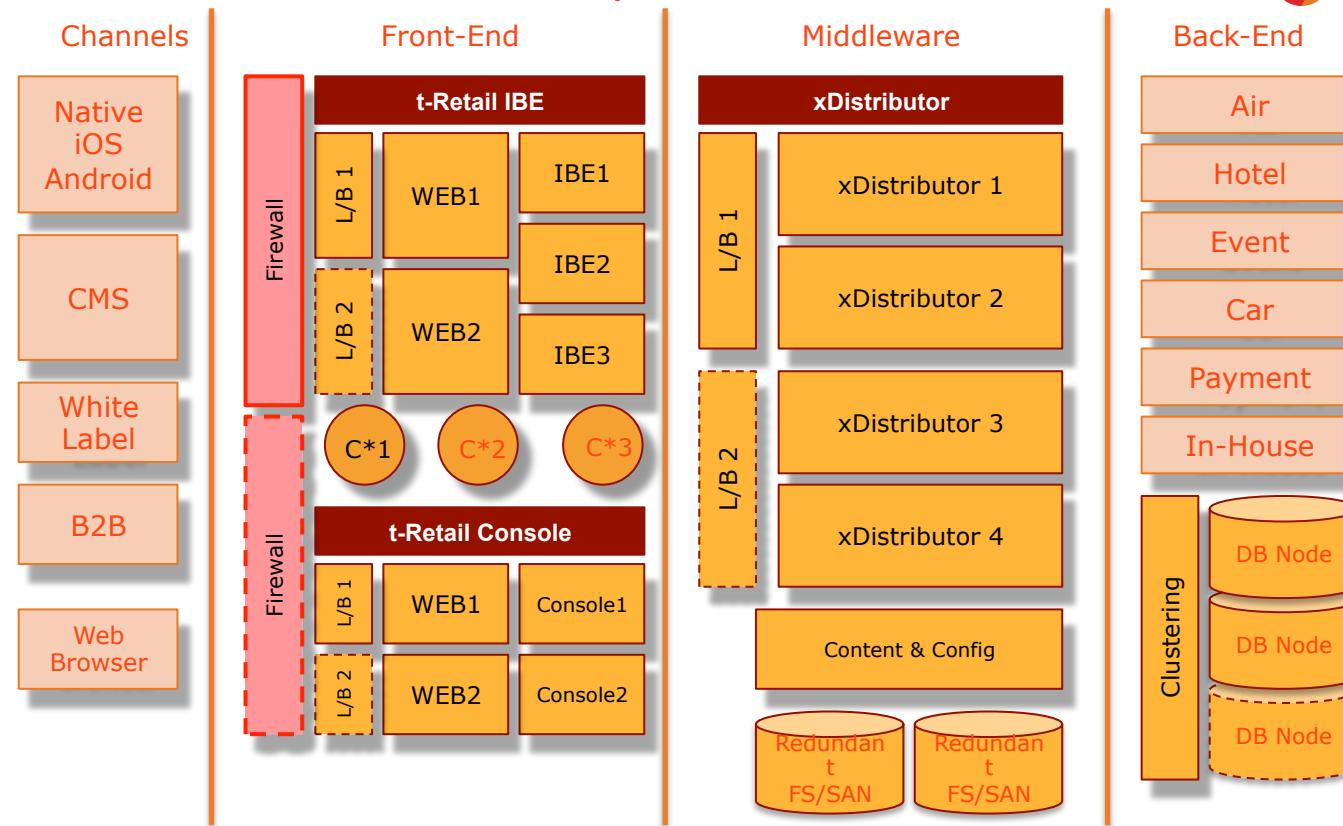
Existing Platform process

- Distributed teams, Scrum (ish)
- Requirements - Product Owners, Product Managers, Customers
- Standard tools – Java, XML/XSLT, Junit, Gitlab, Jenkins, SonarQube, Veracode, Jira, Slack
- Continuous Integration, Teams release incrementally to Master branch, 3 Platform Releases of Master branch a year.
- OpenJaw Hosted and Customer Hosted deployments

QA & Testing

- QA – in house Json framework, Selenium, some manual testing
- Definition of Done checklist : Code checked in, Deployed to Nightly Server, Automated Unit Tests Added and Passing, Automated Functional Tests Added and Passing, All Supported Databases verified, Migration Scripts created, Peer Code Reviews completed, Manual Tests pass, Demo Scripts Demonstrable, Team Regression Tests unaffected, Documentation updates sent to Tech Writer, Inform Training of potential course updates, Release Notes created, Pushed to Trunk, Trunk Regression Tests unaffected, Jira issue updated, Components released

Architecture: Active/Active



Significant Re-platforming is Underway





IBE Re-Platforming

- Code split across Java, JSPs, XSLT
- Difficult to unit test
- Hard to debug
- API is page driven, the lack of modular calls makes it difficult for clients to customise
- Large responses not suited for mobile
- Clean slate
- Completely new API designed according to best practice and implemented with modern technologies
- RESTful API



API definition

- **Swagger** is a project used to describe and document RESTful APIs.
- It is based on the JSON schema draft specification
- Swagger was donated to the Open API Initiative. This a foundation backed by several large companies (Google, Microsoft etc.) who are attempting to standardise REST APIs across the web
- Provides an editor, a GUI for interaction and code generation capabilities

Spring Boot

- Takes an opinionated view of building Spring applications. Spring Boot favours convention over configuration and is designed to get you up and running as quickly as possible
- Controllers and services
- Dependency injection
- Services that mainly work with XML will be written in Groovy to take advantage of it's superior XML handling
- Will be using **Gradle** as the build system
- Embedded tomcat with hot reload for faster development



WireMock

- API simulator
- Used to simulate xDistributor responses
- Allows custom response modification
- Acts as a proxy so messages without a match are passed through to xDistributor
- Can record traffic



Configuration

- Spring Cloud Configuration
- Properties stored in Git repo
- Exposed through web interface
- Zero application code required, properties are automatically injected into Spring environment



Testing

- Unit tests for all code (Junit)
- Spring integration tests
- Small layer of external integration tests
- Code coverage with JaCoCo

UX project

Airline	Carrier Type	OnD	No. of Pax	Calendar	Availability	Pax Details	Visual Style	Overall Experience	
Air Asia	Network Carrier	Megamenu + Search	Dropdown List	Paginated Horizontal	Split Grid List	Nationality + DOB	Modern	4/5	
Aer Lingus	Hybrid	Megamenu	Button Selector	Paginated Horizontal	Vertical List	Name only	Flat Design	4/5	
	Network Carrier	Megamenu + Search	Button Selector	Paginated Horizontal	Vertical List	DOB	Modern	4/5	
				Wizard	Grid Matrix	DOB + Gender + Meal Prefs	Modern	4/5	
				Dropdown List	Paginated Horizontal	Vertical List	Modern	3/5	
				Dropdown List	Paginated Horizontal	Split Grid List	Additional Contact Details	Busy & Dated	2/5

T2 RL screenshot showing the Airline E-Commerce interface:

- Filters:** Airline dropdown menu (Southwest, Ryanair, easyJet, Delta, China Southern Airlines, Gol, American Airlines, China Eastern) and Business Models dropdown menu (Tier 1 (>25M Passengers), All Business Models).
- Table Headers:** Book Flights, Flexible Day Search, Other travel, Online Check-in, Manage Bookings, Online PAX.
- Data Rows:**
 - Southwest Airlines: 114,792,456 passengers.
 - Ryanair: 100,415,700 passengers.
 - easyJet: 54,660,693 passengers.
 - Delta Air Lines: 33,626,426 passengers.
 - China Southern Airlines: 33,305,810 passengers.
 - Gol: 31,366,476 passengers.
 - American Airlines: 30,702,680 passengers.
 - China Eastern: 0 passengers (marked with a red X).

User Flow - Flight Booking

```

graph TD
    A[Search / Direct Traffic] --> B[OnD default state]
    B --> C{Set Locale}
    C --> D[Select Route OnD]
    D --> E{Set Origin}
    E --> F[Search for Origin]
    F --> G[Browse On List]
    G --> H[Select On]
    H --> I{Set Destination}
    I -- Red Arrow --> UI_SetDestination
  
```

Flying from: Dublin DUB, Ireland

Going to: Where do you want to go?

View all destinations

We found 5 flights from Dublin to London Heathrow on 25th March 2017

Going Out → Coming Back ← Passenger info

Sort / Filter options Change search

Departing	Arriving	Flight Duration	Price
09:45 Departing Dublin	11:25 Arriving London Heathrow	1h 30m	€100.00
11:05 Departing Dublin	12:45 Arriving London Heathrow	1h 40m	€155.00
13:30 Departing Dublin	14:55 Arriving London Heathrow	1h 25m	€85.00
15:30 Departing Dublin	16:55 Arriving London Heathrow	1h 25m	€95.00
16:30 Departing Dublin	19:45 Arriving London Heathrow	3h 15m	€125.00



UX Development

- **NodeJS** is a cross platform JavaScript runtime environment, which our server backend provides. It uses Googles V8 JavaScript engine to interpret JavaScript at runtime.
- It allows asynchronous input/output which optimizes throughput and scalability.
- This allows us the use of many packages developed for Node already, making implementation of features faster than developing from scratch.
- **Yarn** to manage our Node packages.
- **Webpack** provides us with a local development server which serves static assets and bundles JavaScript code, automatically refreshing the app as a developer makes code changes. This makes development time very quick, and bugs/issues are caught almost immediately as code is written.



UX Development – React

- React gives us a declarative, component based way to develop an interactive UI.
- It is used as our view layer on top of our API.
- Developing using ES6, which is the latest JavaScript standard. As ES6 features are slowly being implemented by major browsers, we transpile it into ES5 to be compatible with older browsers.
- React also gives us the option to use React Native in the future, which will allow us to develop native mobile apps that cross platform for iOS and Android from one codebase.
- We are using Redux to manage any state we need to maintain in the UI, which allows easy data flow from the API to our React display components.



UX Development - Design

- Sass - to extend our CSS capabilities.
- This allows us to keep the styling of each component with its respective code, adhering to a modular structure.
- We can also use variables and nested rules so switching from one style to another is simple.
- When we are building for production all CSS combined and minified.
- Responsive web design as we develop – desktop, tablet and or mobile format, using a fluid grid, so that page structure is optimized for display on different screen sizes.



UX Development - Quality

- **Eslint** for static code analysis, which highlights problematic code patterns which could lead to issues further down the line.
- This analysis done on the fly so that errors are caught as code is written, before compilation.
- **Jest** to test our code, which provides code coverage reports, and can be run simultaneously as code is being written.
- It watches for code changes as you make them, and runs any tests relevant to that code change, so you can catch any issues quickly during development.

SideBar : Tools of our trade



- Gradle (2007) Yarn, NodeJS, Swagger, Wiremock, React, Jest, Eslint, Webpack, SpringBoot (2014)
- Amazon - Lex (chat bots) Polly (speech) Rekognition (Image), Lamda (Event driven serverless computing)

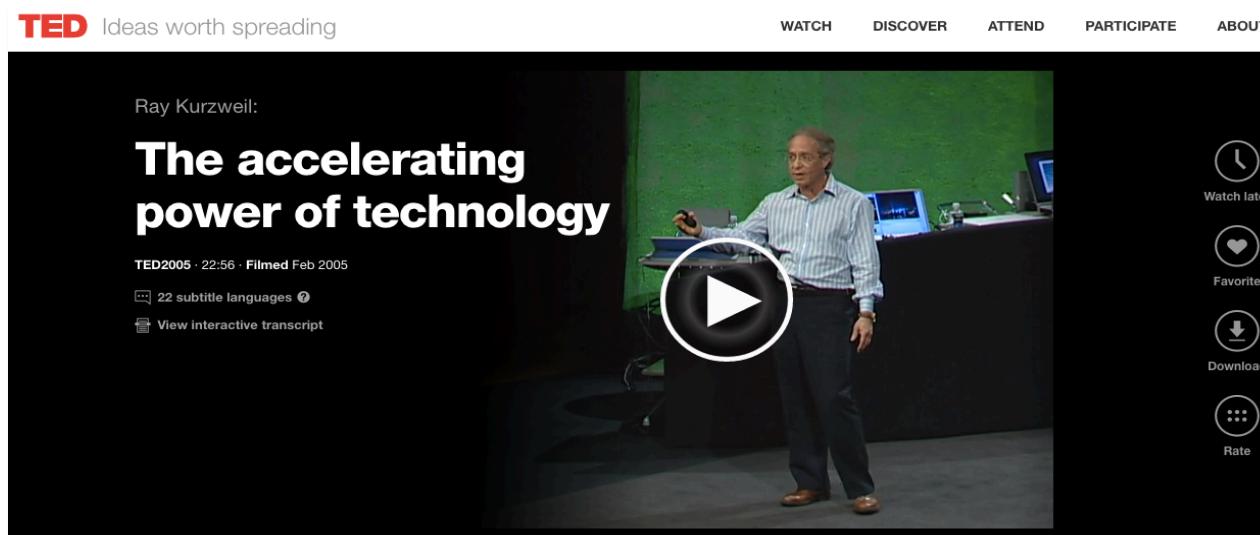
Since 2007

- Ten years ago, the Apple iPhone was just launched.
- The number of people with broadband in the world was less than 300m. Now it is 3 billion.
- By 2016 there were 1bn mobile phones in Africa
- In 2007, Facebook had barely 60m users: today – 1.86bn active users.
- WeChat began as an R&D project in Oct 2010 – now has 846m monthly users, 768m daily logged in users with over 50% spending at least 90 minutes on it. Tencent now a \$240 billion Internet company



Ray Kurzweil, Author and Computer Scientist

Moore's doubling pattern applies to any information technology; once a domain or a technology becomes information enabled, its price/performance doubles annually



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Disruption

- 3D printers - Cost: \$40,000 (2007) to \$100 (2014) Scale: 400x in 7 years
- Industrial Robots - Cost: \$500,000 (2008) to \$22,000 (2013) Scale: 23x in 5 years
- Drones - Cost: \$100,000 (2007) to \$700 (2013) Scale: 142x in 6 years
- Sensors (3D LiDAR – Light Detection and Ranging) Cost: \$20,000 (2009) to \$79 (2014)
Scale: 250x in 5 years
- Startups with scalable models can enjoy exponential success with minimum resources
- S&P companies with size and reputation cannot guarantee to be around tomorrow



SNCF – the behemoth of the European Rail Industry

- Founded in 1938, employs 245,000 people, sales of €27 billion
- 32,000 km of route of which 1,800 km are TGV high speed train





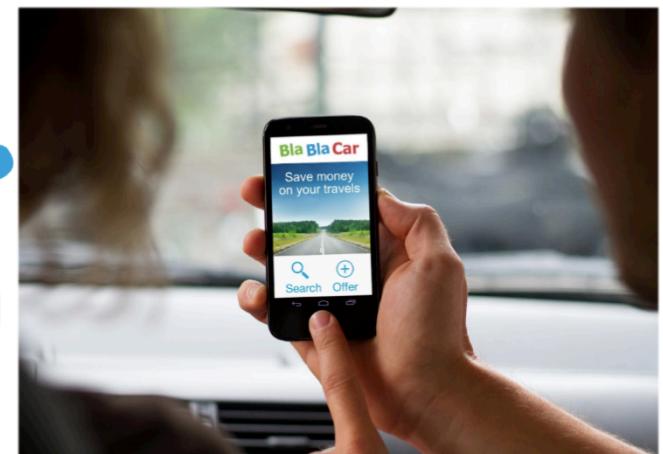
SNCF – What could possibly be Disruptive?

European Union First Railway Directive 94/440/EC to allow open access operations on railway lines by companies other than those that own the rail infrastructure??



BlaBlaCar – the Sharing Economy that is slowly unraveling SNCF

- Founded in Paris in 2006, has 25 million members and operates in 22 countries
- A platform connecting people looking to travel long distances with drivers to share costs
- Trust based community, raised US\$336 million, valued at \$1.6 billion, employees 300





Who is this? What is this?



OpenJaw Technologies

Steve Sasson, Inventor of the first Digital Camera, 1975

- Employed as an electrical engineer at Kodak's Apparatus Division Lab
- “Why would anybody want to look at their pictures on an electronic screen?”
- Kodak buried the technology to protect their chemical and paper business!



Project X



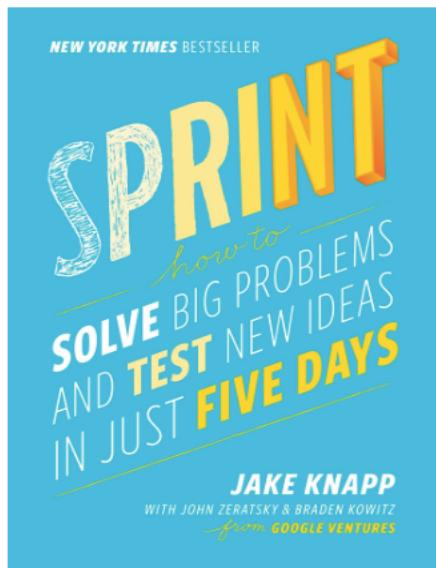
Project X is about building the bridge from '*Cool Idea*' to '*Proven Concept*' and onwards to the '*real-world*', whether that be a significant enhancement to the OpenJaw platform, a new business line or a spin-out business

Aim for diversity: a mix of new products, new technologies and new infrastructure as well as short, medium and longer term projects.

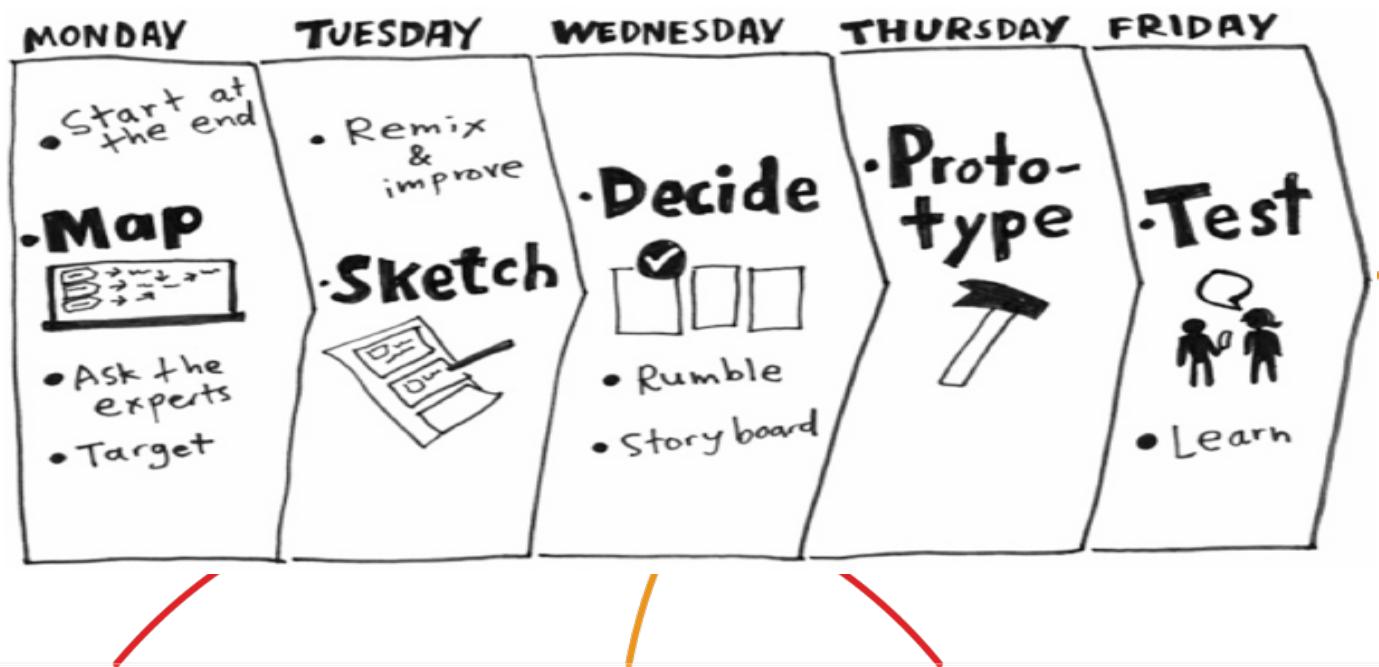


Project X

OpenJaw has taken best practice from the likes of Google X and Google Ventures to create an initiative and develop a clear 3 Stage process - the '*OpenJaw 3D Innovation Framework*' - for how ideas move through the Project X process.



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OpenJaw 3D innovation framework

1. DESIGN: Using Google Ventures Design Sprint to solve problems and test new ideas in just 5 days.
2. DEFINE: The project team get a few weeks to try to understand a potential project's biggest risks; this kills many ideas quickly and without much money being consumed.
3. DELIVER: Extended investigation - a team is given a few months and more budget to build prototypes, targeting the hardest and riskiest parts of the technology to deeply understand the problem they're trying to solve.



“responsibly irresponsible”

- To date, 4 sprints have been run, and we have had direct, live feedback of demos from our existing customers and other contacts in the travel industry
- First project has been running for 4 months, passed Define stage and in delivery. 2 more projects planned and developers being freed up
- Design Sprint definition – no Product Manager, Product Owners, BAs providing requirements
- Not POCs once Delivery phase starts – full engineering standards required but it is a protected space
- Teams of 4 with full freedom of choice on architecture and tools: current project is a MicroServices architecture.



The Future

- We don't know how we will be doing development in 10 years so we have to be ready to try new ways and think differently
- All we do know is that given the pace of change in this industry, it will be different to how we do it now