Making a Business Out of (Predictive Application Management in) the Fog

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CONTINUOUS IOT GROWTH

- Embedded AI
- Autonomous driving
- Drones for deliveries
- Energy production
- Smart Cities
LARGE HIGHLY DISTRIBUTED SOFTWARE SYSTEMS

multi-component

osmotic

microservices
PERVASIVELY DISTRIBUTED INFRASTRUCTURES

cloud

fog

IoT

micro-cloud

edge

mist
STRINGENT QoS REQUIREMENTS
How to deploy (and re-deploy) LARGE HIGHLY DISTRIBUTED SOFTWARE SYSTEMS to PERVASIVELY DISTRIBUTED INFRASTRUCTURES so to guarantee their STRINGENT QoS REQUIREMENTS?
It’s NP-hard!
Research Questions

Which is the *best* deployment (i.e. placement)?

How to achieve an *effective* management?

Much work has been done in this field* by proposing approaches to improve app deployment & management based on predicted KPIs.

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From a *business-oriented* perspective

Is there **room for** a company provisioning **predictive Fog application management** services?

How can such company **create, deliver and capture value for its customers**? Who are they?
Some data about the Fog*

- Fog computing global market will exceed $18 billion by 2022
- Annual growth rate of 110% in 2018-2022 for Fog services
- Market share increase from 15.7% to 20.4%

Some assumptions

What could be the business model of such a company?

https://di-unipi-socc.github.io/
Tools

Business Model Canvas Methodology
(Osterwalder and Pigneur, 2010)
Our Actors

Asset Manufacturers (AMs)
- Cisco
- Huawei
- Nebbiolo Technologies

Infrastructure Providers (IPs)
- AWS
- Vodafone
- Packet
- Azure
- Hue

App Operators (AOs)
- IKEA
Market Forces

Market Issues
• Towards the Edge -> less powerful, user-managed devices
• Large-scale to be tamed (infrastructure and apps)

Market Segments
• AMs (and smaller start-ups)
• IPs (and telco, federated providers)
• AOs (and IoT producers)

Needs & Demands
• Apps & resource management, SLAs, more control for the users

Revenue Attractiveness
• Short-term trial -> acquiring know-how
• Outsourcing application management and federation
Industry Forces

Competitors
• AMs and IPs that can leverage competitive advantage
• AMs and IPs limited to their infrastructure(s)
• Third-party «broker» can be considered more trustworthy

Substitute Services
• (Semi-)manual management -> time-consuming & error-prone

Suppliers and Other Value Chain Actors
• IPs must provide data on their infrastructures
• Partnerships or acquiring *know-how*

Stakeholders
• Influencers, governments, researchers
Key Trends

Technology Trends
• Growing Internet access (51%) and QoS, cheaper hardware
• Interest in automated app management (TOSCA)
• XaaS -> Management-as-a-Service (?)

Societal & Cultural Trends
• From mass production to mass customisation
• Greater user-awareness on trust, privacy and security
• Need for human-centred designs

Socio-economic trends
• Large investments in e-health, automotive, industry 4.0
Macro-Economic Forces

Global Market Conditions

After a volatile end to 2018, tentative stability has returned to risky markets at the start of the new year[...]. Growth momentum has slowed, but the deceleration phase should end before midyear with supportive and flexible policy actions[...]. Recession risks, in the meantime, remain modest for the year ahead.

(JP Morgan, 2019)

Capital Markets

• Incentives for start-ups and Industry 4.0

Commodities and Other Resources

• Developer salaries in the range 40K-80K USD
ASSET MANUFACTURERS

PREDICTIVE APPLICATION MANAGEMENT SERVICE FOR AMs’ ECOSYSTEMS

Key Partners

Key Activities

Value Propositions

Customer Relationships

Customer Segments

Key Resources

Top Quality Predictive Methodologies

Channels

Revenue Streams

Cost Structure

Costs

Personnel Salaries

Web Marketing Costs

Cloud Resources

Licensing

SALES NETWORK

WEB

Self-Service

Support Service

ASSET MANUFACTURERS
Concluding Remarks

• Business Model Environment analysis
• Two prototype Business Models

Selling *know-how*

Independent company
Next step: go to market...
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