

Challenges of modern Preventive Healthcare

IPIC 2016

Atlanta, Georgia

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Agenda

- Introducing Hyperconnected and preventive health care
- Industry cases
- Research topics and avenues of research
- Conclusion

Bringing PI to the Middle East...

MOU signed between CUD and GeorgiaTech

- Initiators: Benoit Montreuil and Marc Poulin
- Initiated “Hyperconnected Health Lab”
 - Collaborative, global research
 - Student projects, internships
 - Faculty visits, teaching in Dubai
 - Support from local stakeholders

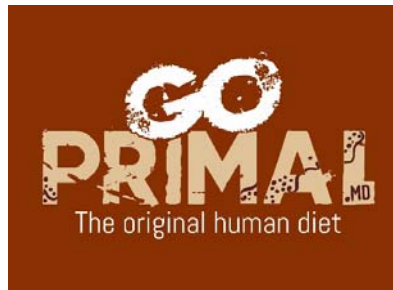
Canadian University Dubai

- Founded in 2006, 2800 students, 300 MBA, still growth phase
- First recognized Canadian University outside Canada. All programs from Canada.
- Named best university in UAE by Forbes Middle East, within a competitive environment of 105 universities
- Undergrad in SCM, health care management
- Starting DBA in Leadership and Health Management, in collaboration with Columbia University
- Owned by local Emirates, and partly by Dubai govt.

Hyperconnected Health Lab



Context



Introduction

Growing issues in health care systems

- Costly, not very effective
- General practitioners difficulty to keep up
- Reactive systems
- Financial incentives to treat symptoms, not the cause
- Fragmented services
 - Growing technology offerings
 - Growing number of specialists

Introduction

Changes to address issues health care systems

- **P4** approach: medicine is “personalized, predictive, preventive, participatory”
- Pressures to reducing global health costs through prevention
- Holistic, integrative approaches
- Predictive techniques
- Compensations systems for prevention (Discovery Health)
- Vertical integration in health industry for holistic approaches
- Consumer is active, pro-active, wellness driven
- Growing number of medical devices, apps

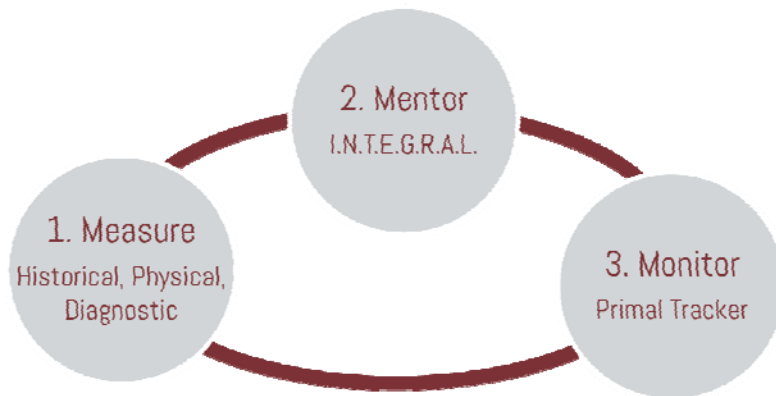
New offers from the Industry

- B2B Model
 - Primal MD
- B2C Model
 - Ageback
 - Health Resorts
- Clinics
 - Primal MD cardio metabolic clinic: Intelligent Health Clinic
 - Primal MD holistic clinic: SENS

B2B Model: The case of Primal MD

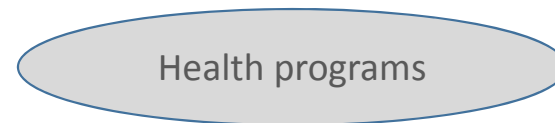
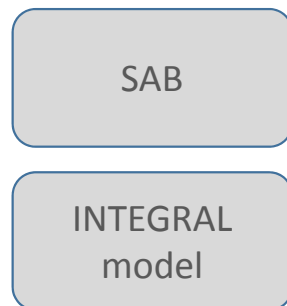
- **Primal MD** was formed in 2014 in order to reverse inflammation, cardio-metabolic and other autoimmune diseases, the 21st century global epidemic, responsible for killing 80% of individuals.
- Eating too many carbohydrates and vegetable oils, which are the staples of a traditional western diet, causes **cardio-metabolic disease** including: obesity, diabetes, heart disease, cancer, Alzheimer's and autoimmune disease, and among others.
- PrimalMD has developed a unique, comprehensive, preventive **platform** to tackle this health epidemic.
- Central to the platform are health **programs** developed by Dr. Graham Simpson MD

Offering of Health Program



I.N.T.E.G.R.A.L model

1. Inflammation Control
2. Nutrition & Metabolic Balance
3. Toxin and Cancer Reduction
4. Exercise Performance
5. GUT Microbiome and Mitochondrial Mastery
6. Restoration of Hormones
7. Advanced Supplementation
8. Lifelong Mindfulness and Stress Management



Paleo Food

Paleo Insta-Heat Pot

Paleo, organic, gluten free,
no preservatives or additives
Patent Insta-Heat pot heats itself
within 10 min,
stays warm for 20 min
Shelf life of 2 years
Multiple market opportunities

Paleo Fresh

Health Co. collaboration, daily fresh food

Paleo Snacks and Beverages

Paleo Vending

Modern vending machines will be strategically
Located to sell our paleo food.

GOPRIMAL PALEO MEAL

Fresh from the garden is best but the next best option, especially for busy people on the move, is our patented Paleo Insta-Heat "pot" – ideal for home, work or outdoor activities.

Organic, low carb, gluten free, high protein Paleo meals are always ready!

- Can be stored for over a year without refrigeration
- No preservatives, no additives
- Delicious organic meals



Quinoa Chicken Casserole



Beef Moussaka



Chicken Meat balls with Spicy Tomato Sauce



Chicken and Apricot Tagine



Chicken Cubes in Tomato Curry Sauce



Lamb Tagine



Turkey with Mixed Peppers



INSTA-HEAT TECHNOLOGY

Kiss your microwaves goodbye! Paleo Insta-Heat 'pots' are shelf-stable ready to eat meals that contain their own heating device. The technology used in the self-heating unit, which is based on the reaction between Quicklime and water, both of which are natural substances, permits a meal to heat up to 140°C in 10 minutes. You simply need to press the activation spot on the underside of the "pot" and the food is instantly heated! No need for ovens, microwaves, or other external heating sources!



**CANADIAN
UNIVERSITY DUBAI**
Your portal to Canadian education

Pharmaceuticals / Nutraceuticals

- Partnering with a world-class compounding pharmacies
 - Dubai and USA suppliers
- **Nutraceuticals**
 - Provides high quality nutraceuticals
 - Collaboration with Dr. Mark Houston
 - We have exclusivity contract for India
 - Will first drop ship from US until they are registered
 - We have very good wholesale price
 - Clinical studies are done with **Mayo Clinic**



<https://www.thorne.com/>

Laboratories

Vibrant

Rising laboratory in the US who has unique techniques and patents on conducting specialized tests.

Advance tests, Genomics test, Gut tests

SpectraCell

Leader in nutritional testing

Laboratory located in the Texas, US.

Known for high quality standards.

Provides another group of blood tests



<http://www.spectracell.com/>

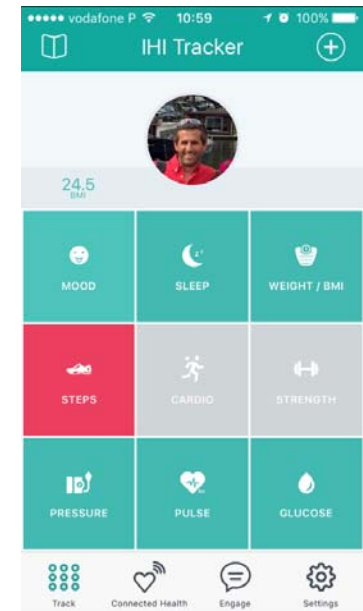
Monitoring : Apps and Devices

Primal Tracker and Primal Pro Dashboard

- **Primal Tracker app** developed by **Tactio** (over 5M users) to **monitor** vital signs in real time for cardio-metabolic disease, communicated back to health practitioner's **Primal Pro Dashboard**
 - Currently making agreement for MENA

Devices to capture data

- FitBit, smart watches
 - Captures steps, heart rate, sleep information,
- Scales
 - Captures body fat, weight



Genomics

- **Gene sequencing**
 - Adapted for genes related to cardio-metabolic disease.
- **Genomic Medicine:** An emerging field that involves using genomic information about an individual. We sequence the entire genome. Also know a Personalized on Precision Medicine.
- **Epigenetics:** Involves genetic control by factors other than the individual's DNA sequence.



Stem Cell

- BioScience co in Italy
 - Provider of Stem cell products
 - Genetics
 - High quality, global
 - Unique, modular stem cell factories



Medical equipment for programs

- **Itamar**
 - Endopat and Endowatch products for cariodmetabolic markers
- **Thyroflex**
 - Device to measure thyroid
- **Angioscan**
 - Device to measure vascular age
 - Significant cost reduction
 - Exclusive agreement

PEMF

PEMF: Pulsed Electromagnetic Frequency

- Medical instruments to prevent and treat a wide range of pathologies
- Benefits
 - Improved **micro-circulation**
 - Increased **supply of oxygen**, ions and nutrients to cells (up 200%)
 - Increased **ATP production** by excitations of electrons
 - Stimulation of **RNA and DNA** production
 - Accelerated **protein bio-synthesis** by electron and energy transfer
 - **Anti-oxidation regulation** with increased circulation of available electrons
 - Increased **calcium** transport and absorption for stronger bones, joints and muscles. (up 33%) More than DNA is dictating.
 - Enhanced cellular and tissue **elasticity** with increased collagen production.
 - Increased **cellular genesis** promoting bone, cartilage, tendon and soft tissue growth. (up 33%)
 - Stimulation of cellular **repair mechanisms**. (Wound healing up by 30%)

SwissBionics and **Curatron** manufacturer as suppliers

Health Coaching

Assists the patient on their journey to

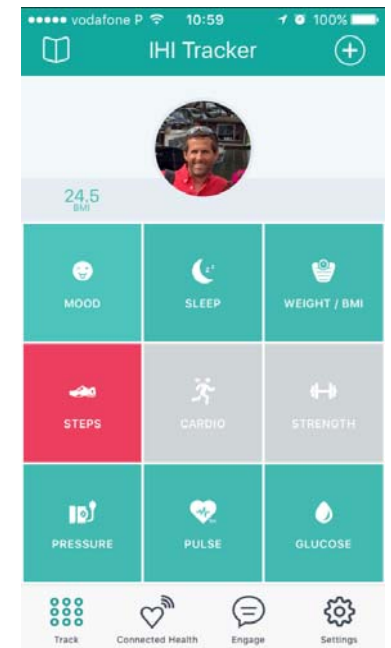
- Coaches are registered and trained by Primal MD
- Coaches charge their fees and obtain commission on GoPrimal products bought by clients

Variety of programs

- Weekly meet ups with Health Coach
- Follow a diet program (what to eat/not to eat) for specific health concern (approved by Primal MD SAD)
- Shopping trips to grocery stores
- Education on nutrition, self-care, stress management
- Recipes
- Health Concierge options (24/7)
order healthy food / advise on PT, yoga studios etc. / send health articles / invite to health workshops & retreats.

USPs

- Specializes in **Cardio metabolic diseases**
- **INTEGRAL Health** model
- Convenient, and unique self-heating **Paleo food**
- Complete **genomic** sequencing, **epigenetics** and **stem cell** products
- Offers unique **health apps** and a real-time **monitoring** system
- **Accessible** pricing for the mass market
- **Comprehensive**, turnkey solution
- **Compounding pharmacy** (Hormones & Nutraceuticals)
- Connected **Health Devices** (PEMF, FitBit, Scales)

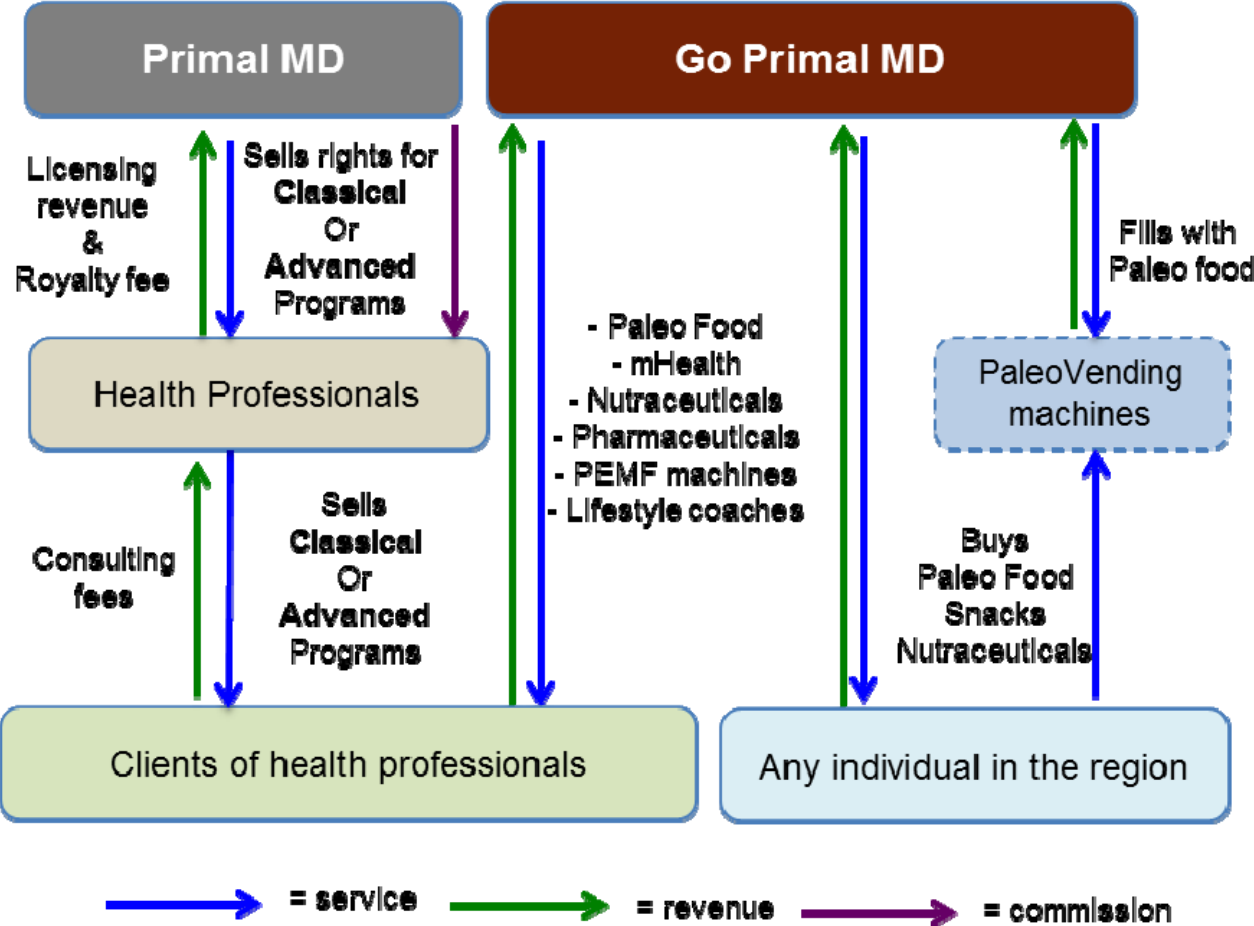


Objectives of Primal MD

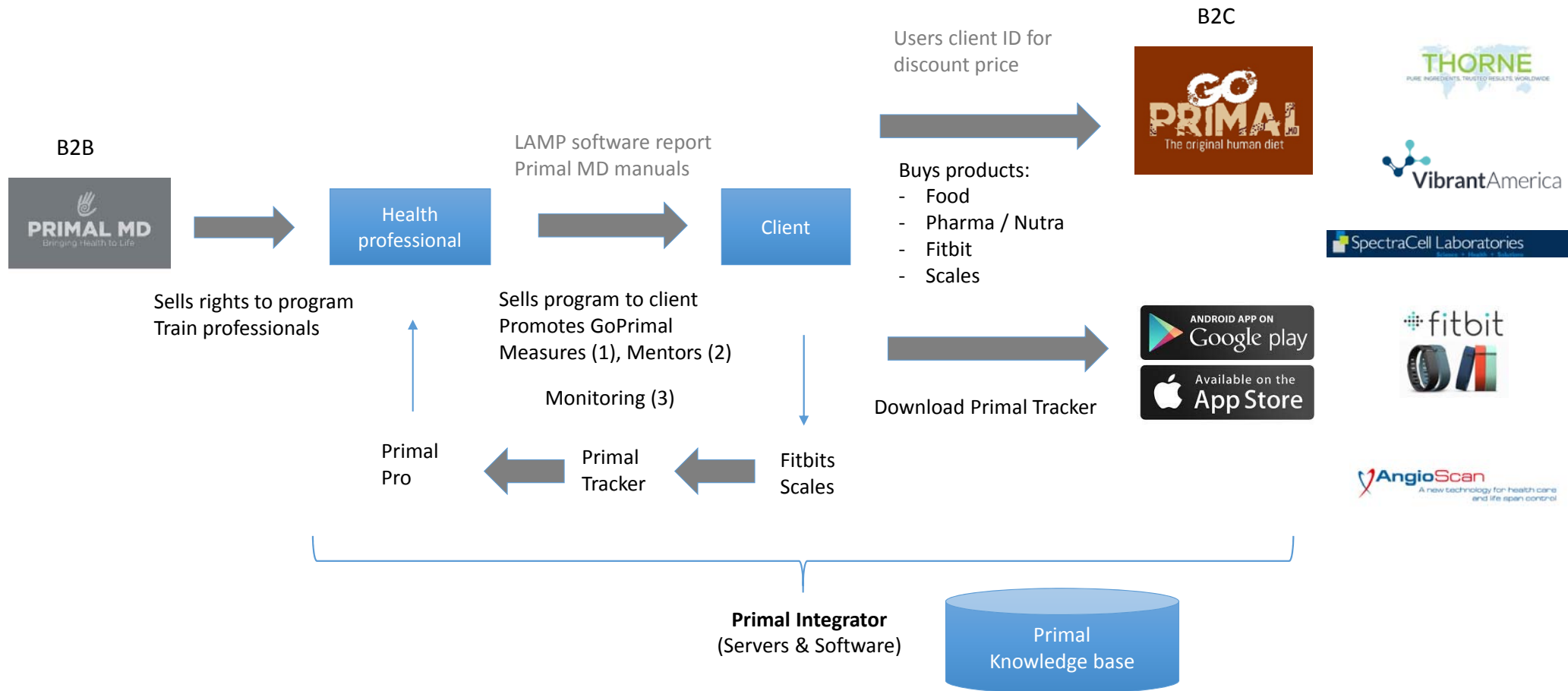
- Personalized
- Affordable to the mass
- Variety of services
- Holistic approach
- Preventive approach with real-time monitoring
- Scalable, mobile
- Repeatable
- Proven results



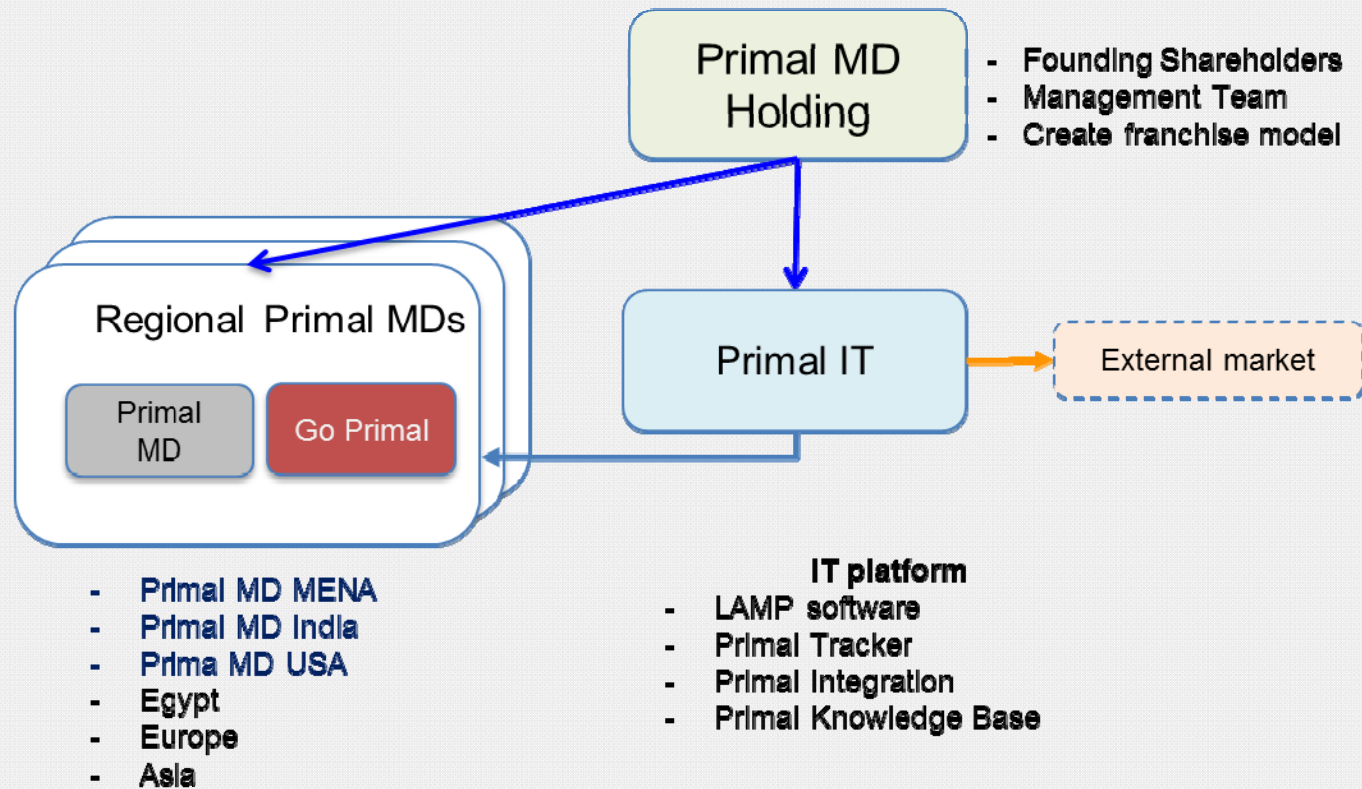
Business model



Actual Service Process



Primal MD Holdings JV model



PI Opportunities for research

Product and service design

- Centralized expertise, local application
- Many input sources and data points (200+) for programs
- Personalized mentoring
- Real time monitoring
- New offering in health care: awareness of actual value in preventive health care

PI Opportunities for research

Real-time monitoring

- Standardization of data across regions, equipment, ethnicities
- Bandwidth capacity in real time
- Internet of things for capturing data
- Regulations for uploading to the cloud
- Cybersecurity of personal health data

PI Opportunities for research

- **Supply Chain and Operations Management**
 - Sourcing globally from high quality suppliers
 - Shipment sizes, containers, testing modules, data requirements
 - Local regulations, import constraints, pricing
 - Speed (24 hr for some blood tests)
- **IT platform**
 - Handling high volumes of data
 - Cyber-security, regulations
 - Centralizing user data for mining, tracking, learning

B2C: Ageback

- Online community interested in preventive health care
 - Free members
 - 200K users receiving free information, media and evaluations
 - Paying members
 - 5% of free members become paying members
 - Obtain more information and services
 - Can buy various health programs that include:
 - Doctors, nutritionists, personal trainers supporting virtually and live
 - Test/diagnostics, and access to high quality products at rebate



PI Opportunities for research

- Online content optimization, demand creation
- Enormous big data
 - Targeting 50M members in 2017
 - Initial launch in China, India, and USA
- Distributing products globally
- Online professionals to support users
 - Requires 1 coach/500 users...

Research topics initiated

Supply Chain& Logistics

1. Business model in preventive health care
2. Service and product design for variety
3. Hyperconnected supply chain design
4. Real time monitoring
5. IT design

Other business functions

- Marketing & Sales, consumer behavior in preventive health care
- Global regulations in the health industry
- Distributed and continuous education/training for health care professionals
- Business leadership for health care professional

1. Business Models for preventive health care

Main challenge is being able to offer **personalized products** and services and reasonable cost and delays

- Mixed mass customization approach
 - Considers variety in products and services
 - Based on modules, platforms and efficient design

Literature: Fundamentals of Mass Customization

Mass Customization

Producing **variety near mass** production costs and response

(Davis 1987, Piller 2002, Poulin 2006)

Origins

- Future Perfect, “Mass Customization”, Davis (1987)
- Roots in Japan and Europe (Germany)
- IIMCP.org (Institute) & MCPC (conferences bi-annually since 2001)



Evolution

- 1990s: success and failures
- 2000+: established success
- Will continue to grow as a business model



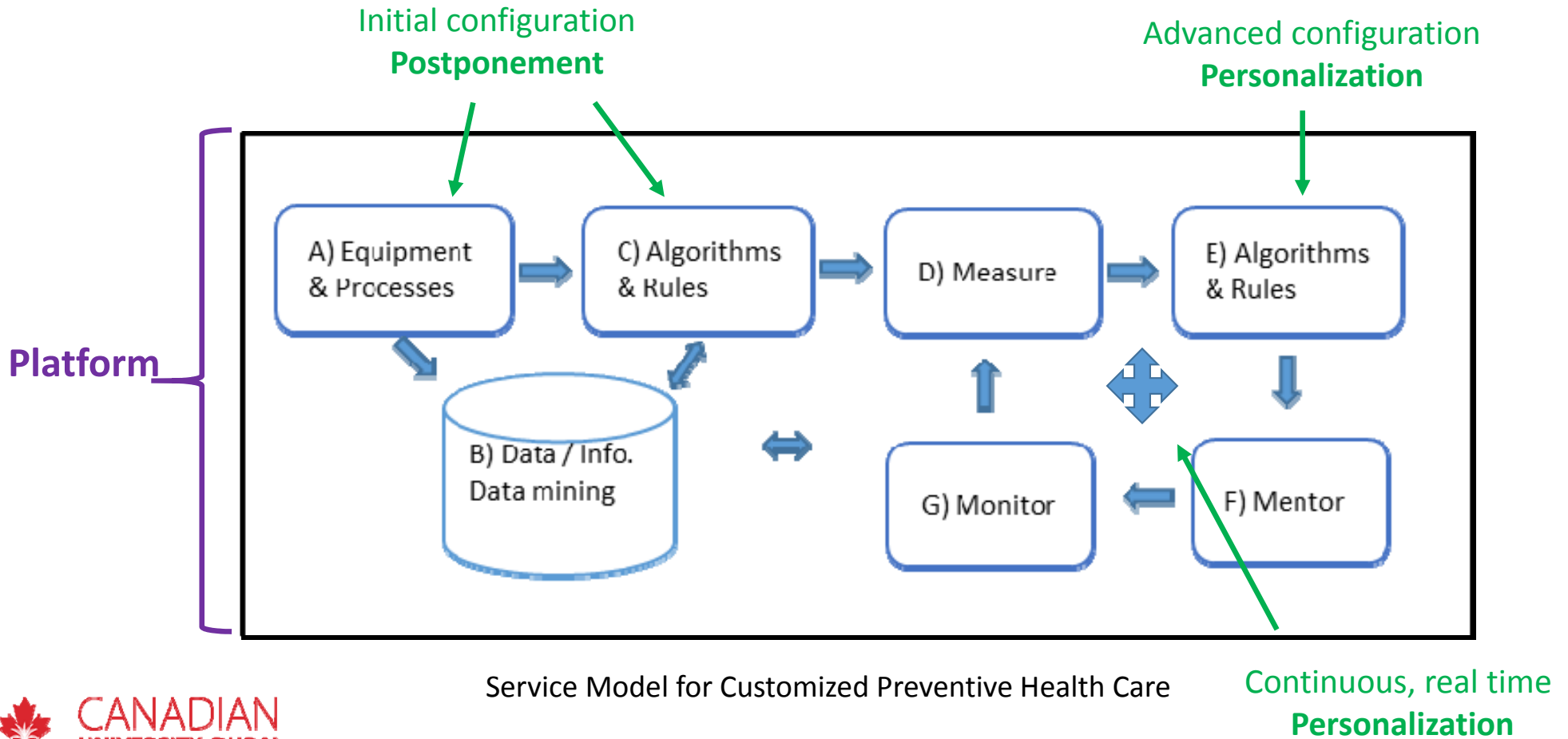
Fundamentals of Mass Customization

Key success factors

- Customer involvement
 - Involvement in the design process (Mintzberg 1998; Piller & Tseng 2002)
- Fitting customer needs
 - *Configurators* (Riemer 2003, Hvam et al. (2008))
- Product design
 - Modularity, platforms, standards (Pine 1995, Agard and Tollenaere 2002, Agard and Kusiak 2004)
 - Product differentiation for postponement (Forza et al 2008)
- Production flexibility and agility
 - 3D printing, FMS, “ - to order” systems



Analysis of Customization Process



Product vs Mixed Customization

Product Mass Customization

Mixed Mass Customization

Product platform

Components, modules, rules,
identified solution space

Service: tests, mentoring (profiles)

Product: nutraceuticals, compound pharmacy

Modules: groups of tests for multiple offers

Expert rules to narrow solution space

Postponement

Standardized components and
fixtures

Standardized services during
measurement

Customer involvement

Customer input at various
production phase

Customer involved at all stages

Configurator

Matches offering to customer needs
Use of online configuration tools

Questionnaire and interview supported by
software with algorithms

Data mining improves personalization of service

2. Product / Service design of personalized offer

a. How to create an efficient product platform to support the offering?

- How many modules?
 - Which parts to standardize?
 - Which technologies used to produce?
-
- Example for blood test
 - Many types of blood test panels exist
 - A certain set of blood test panels can satisfy all diagnostic requirements from a physician
 - Must consider:
 - Multiple suppliers, pricing, transportation time, and quality of tests
 - Location of clients, types of clients

2. Product design: Optimization of user modules

Single Client Testing Module Optimization

Supplier independent, multiple supplier per client

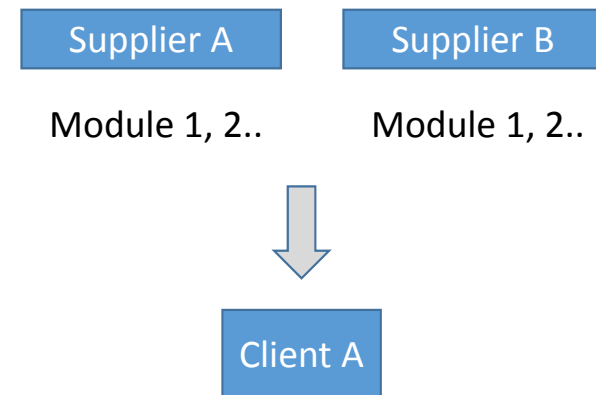
MIN $\sum c_{ms}A_{ms}$ m: a module from a supplier s

$$\sum_{(m,s) \in M_t} A_m \geq 1 \quad \forall t \quad A_m = 0 \text{ or } 1$$

$$\sum_{\forall s} U_s = 1 \quad \forall t \quad U_s = 0 \text{ or } 1$$

More complex versions should consider:

Fixed costs, Economies of scale, rebates, transportation costs, lead times, etc.

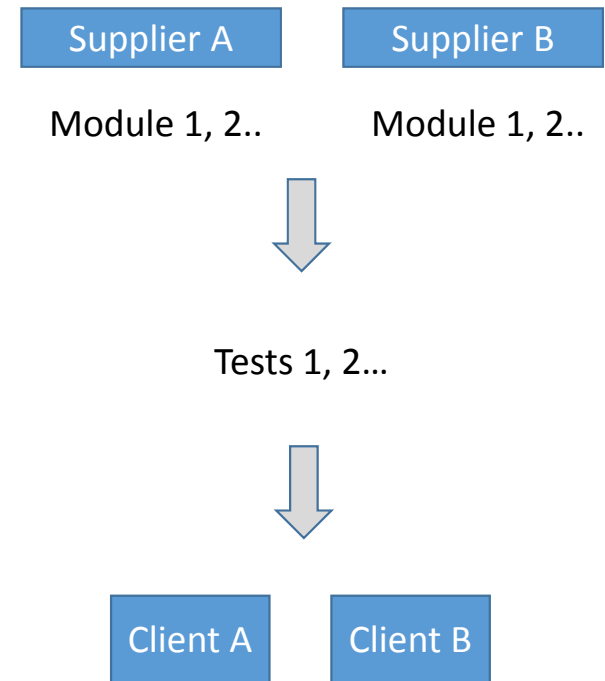


3. Hyperconnected Supply Chain design and operations

a. Testing module set optimization, multi-client over planning horizon

Modules (M1-MM)	Testing capability								
M1	x	x	x				x	x	x
M2	x	x	x	x		x	x		x
M3	x			x	x	xx	x		x
...									
MM		x	xx	x		xx		x	x

Clients (C1-CC)	Tests						
	T1	T2	T35	T98....	TT
C1	1			1			
C2		1				1	
C3	1	1					1
...							
CC							



3. Hyperconnected Supply Chain design and operations

- a. Testing module set optimization, multi-client over planning horizon

$$\text{MIN } \sum c_m Q_m + v_m U_m + \sum_{c,t \in T_c, m \in M_{T_c}} c_{tm} A_{cm}$$

$$\sum_{m \in M_t} A_m \geq 1 \quad \forall c, \forall t \in T_c$$

$$Q_m = \sum_{\forall c} n_c U_{cm} \quad \forall m \quad n_c = \text{number of clients of type } c \text{ (distinct combination of tests)}$$

$$A_{cm} = 0 \text{ or } 1$$

4. Real time monitoring

- Body sensor network design
 - Selecting proper device (fitbit, iHealth)
 - Integrating new sensors (clothing, chips, watches)
- Minimizing acquisition and bandwidth costs while maximize convenience
 - MS Azure
 - Regional database
 - Desktop and cloud storage in function of regulations

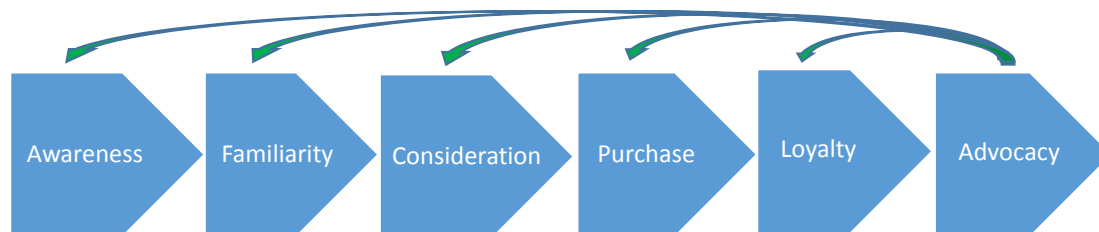
5. Big data analysis

- Collecting and analysing client data
 - Analysis and learning-based functional specification design

Non SC & Logistics topics

- Marketing & Sales, consumer behavior in preventive health care
- Global regulations in the health industry
- Distributed and continuous education/training for health care professionals
- Business leadership for health care professional

Developing Awareness



OBJECTIVE	<ul style="list-style-type: none"> →Doctors should see preventive care as relevant to them and their patients 	<ul style="list-style-type: none"> →Understand what preventive care is, what it entails, and what the service offering would be to the patient →Understand how it compares to practicing reactive medicine 	<ul style="list-style-type: none"> →This is a business model that a physician can make money from, as well as help patients improve quality of life →Evaluate it compared to practicing reactive medicine →Conclude they can be successful 	<ul style="list-style-type: none"> → Signs with the company and selects the option most suited to their needs 	<ul style="list-style-type: none"> →To build long term relationship between company and physician whereby they continue to offer preventative care 	<ul style="list-style-type: none"> →To turn them into advocates within the physician community and with influencers
SOCIAL MARKETING AND SALES STRATEGIES	<ul style="list-style-type: none"> →Introduce the importance of preventive care and how it differs from reactive →Clinical evidence and Physician and Patient testimonials 	<ul style="list-style-type: none"> →Use of marketing materials with the Business Value Proposition and Customer Value propositions for reactive care →Sponsored conferences with other physicians in the field 	<ul style="list-style-type: none"> →The ability for a physician to shadow other doctors →Introduce the incentives for training within clinic →Presenting business model →Personal Selling strategies (demonstrations) →Relevant marketing materials (e.g., brochures, videos, electronic guides) →Discussion of operational support →Financial incentives from both services and products →CME credits at conferences 	<ul style="list-style-type: none"> →Discuss the different programs based on amount of equipment required by physician →Discuss financing and contracting 	<ul style="list-style-type: none"> → Account management structure to ensure physician has successful outcomes -Incentive programmes for patient outcomes - Incentives for doctors to drive patient referrals 	<ul style="list-style-type: none"> →Physician presenting at conferences

Preventive Care Integrated Advocacy Path Model

Leadership for Health Professionals

- Primal MD revenue model for health professionals
 - Business opportunity requires small business skills
- Adopting newer approaches
 - Leadership skills to lead a clinic and clients