



FoodLog: Multimedia Food Recording Platform and its Applications for Athletes' Nutrition Management

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**For a Dietitian
Nutrition Management App**

FoodLog Athlete



We would like to thank Editage (www.editage.com) for English language editing.

What is FoodLog Athlete?

FoodLog Athlete is a nutrition management app developed by Aizawa Laboratory of the University of Tokyo for communication between athletes and dietitians. Athletes can receive dietary feedback from registered dietitians using this app. The app can be downloaded from Google Play and the App Store.

Easily manage food with photos



Athletes can create a FoodLog just by taking a photo, since the app automatically recognizes your meal. You can also search without a photo using a database of

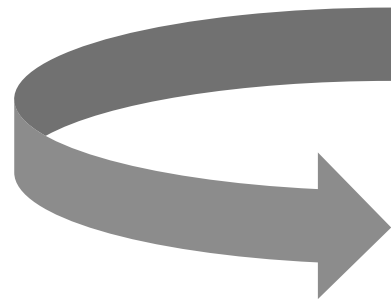
Outline

- **Introduction**
- **FoodLog**
 - **Current state,**
 - **Accuracy limitaion-**
- **FoodLog for Athletes and Dietitians**
- **Conclusion**

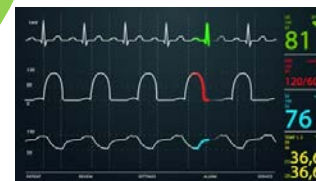
Technology Progress for Daily Healthcare

Energy(Food)
Intake

Energy
Consumption



Vital Signs



Fatter Still

(Scientific American
Aug. 2016)

- The world is entering new era of severe obesity.
- Humans in the world grow heavier.
- BMI growth rate Before vs After 2000. Positive in almost all countries.



Traditional Food Recording

Food Recoding: Traditional



がんばって
記録しよう!!
ファイト!ケロッ!

食事日記

**Simpler
Example
(Health Center)**

- *food name
- *volume

**This sheet is
used for a
weekly report of
three month
long program.**

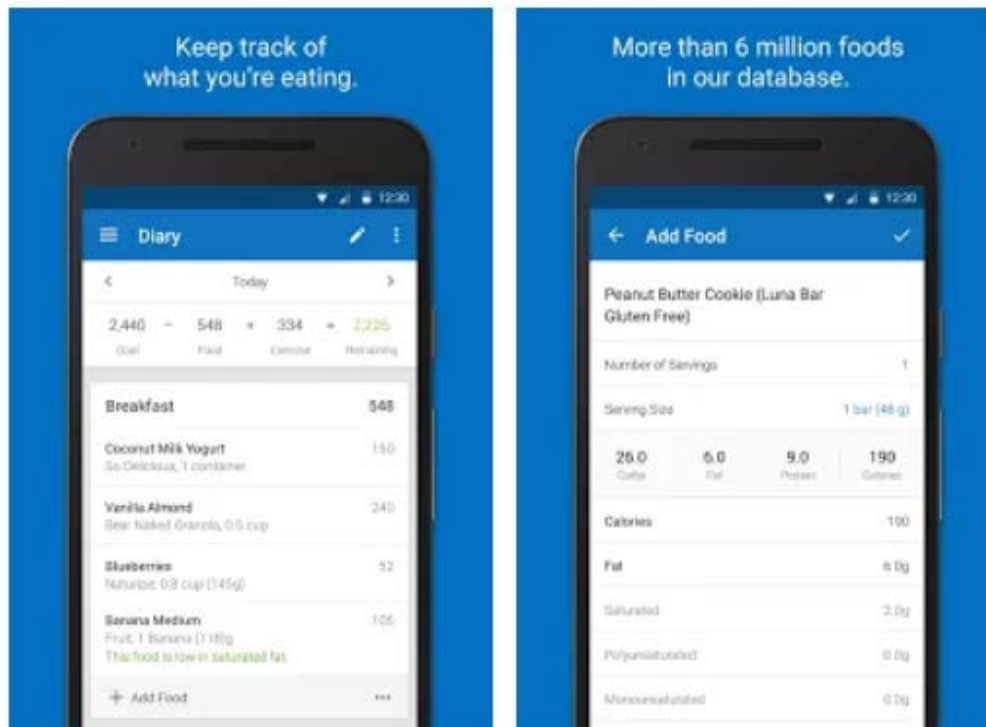
	3月 11日	12日	13日	14日	15日	16日	17日
朝食							
間食							
昼食							
間食							
夕食							
その他							

夕食後の「その他」の欄には、夕食後に食べた飲食物を記入しましょう。
但し、夕食後以外の記入しきれなかった飲食物については、○で囲みましょう。

コメント:
Feedback from the dietitian

General smart phones apps for food recording

- Smart phones are the most familiar device.
- However, many rely on text input which is tedious.



MyFitnessPal

MULTIMEDIA FOOD RECORDING: FOODLOG

(publicly available 2009~19)

(1) FoodLog Web : Food Diary

Analysis and visualization of photos of food record

<http://www.foodlog.jp/>

FoodLog is the world's first web service for food-logging. You can record foods you eat and manage your dietary habit just by submitting photos you take.

FoodLog service analyzes dietary balance from photos taken and displays the result. You can see your food record in a calendar format, which makes it easy for you to understand your dietary life with FoodLog.



(publicly available 2013~)

(2) FoodLog App : Food recording assisted by image retrieval

<http://app.foodlog.jp/>



FoodLog App is an application which helps us recording daily meals easily and precisely.

You can record the name and amount of meals you eat with little effort. FoodLog App allows users to employ meal photos to help them input textual description based on image retrieval. It is amazingly helpful!



1. Specify location



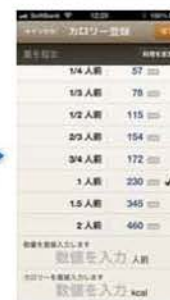
Analysis begins when you long-tap the location of each dish.

2. Choose dish



FoodLog App displays the candidates for your dish. Tap the correct one which matches to photos

3. Specify amount



Choose the correct amount, and tap the "Finish" button.

4. Finish!

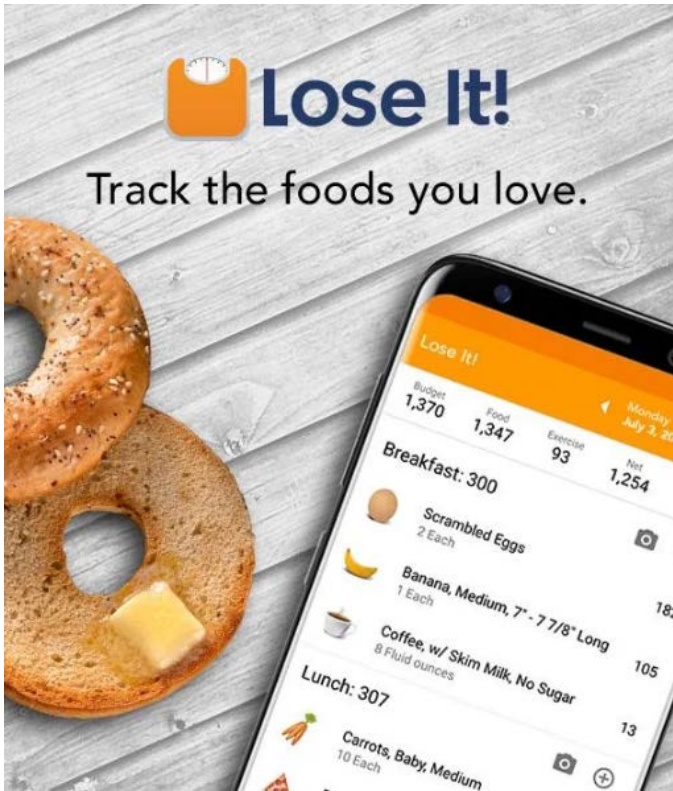


You can register other dishes on the same photo just by repeating the same

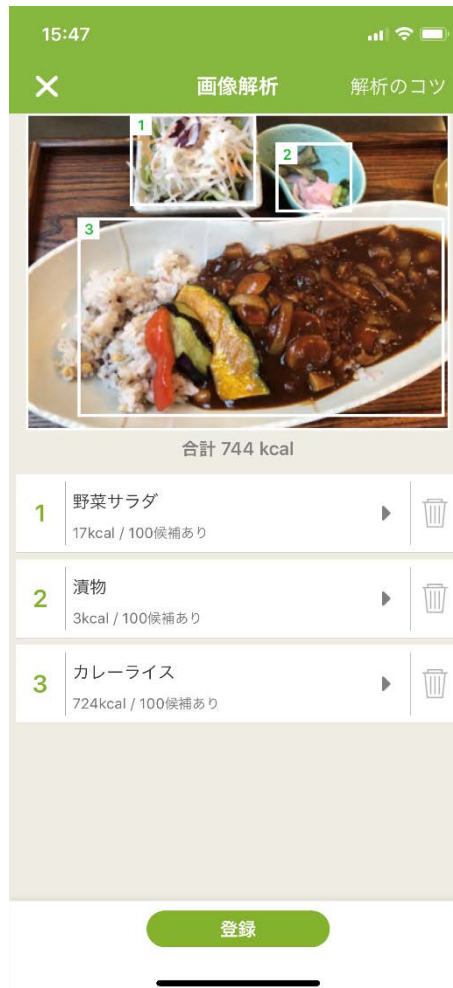
MULTIMEDIA FOOD RECORD

Today, use of images becomes popular

◆ Lose It!



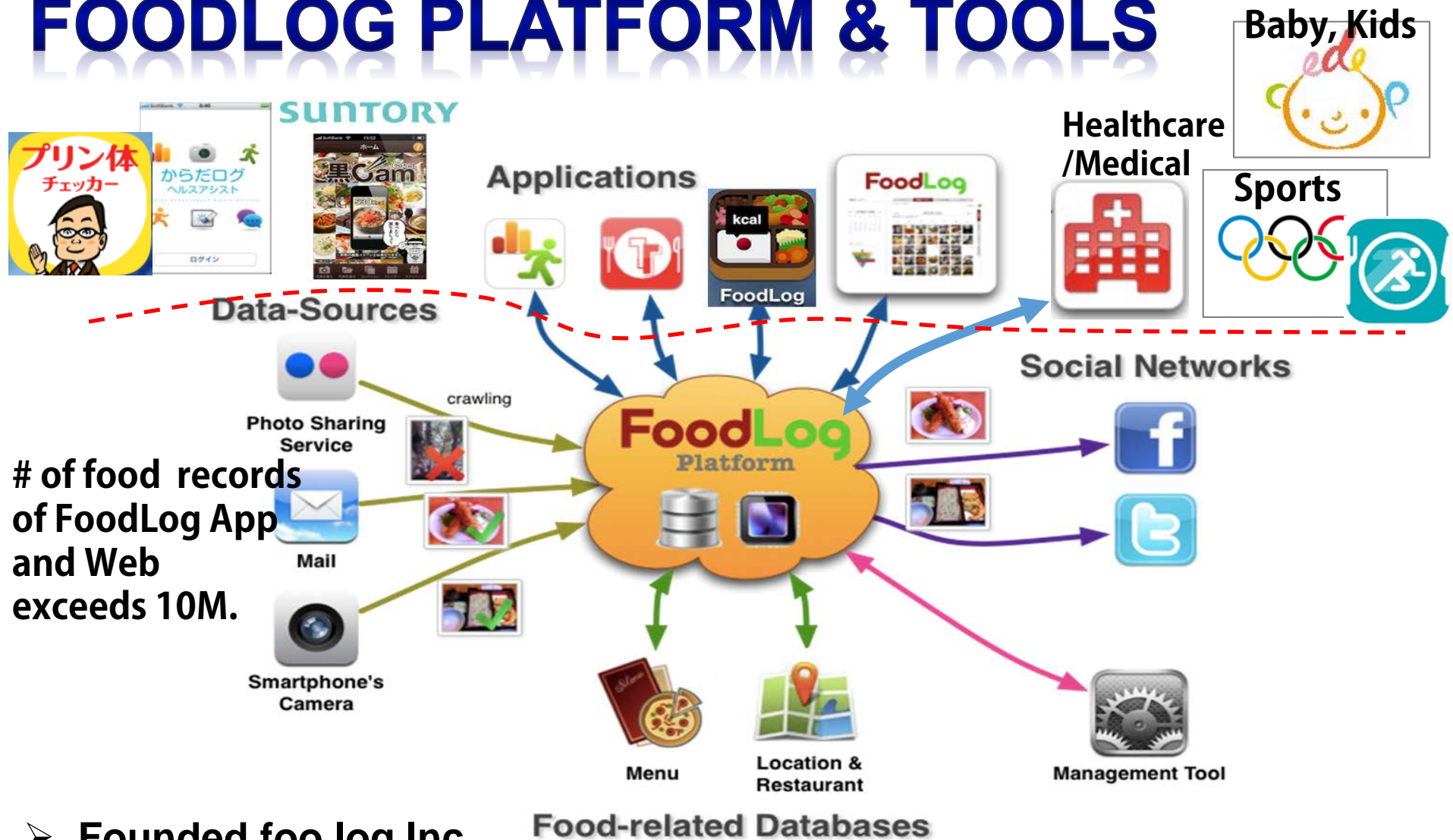
◆ Asuken



◆ Calomiru



FOODLOG PLATFORM & TOOLS



of food records of FoodLog App and Web exceeds 10M.

- Founded foo.log Inc
- Cloud based Platform for food recording
- Various applications

- WebAPI is provided to more than 30 organizations.

FoodLog History

- ◆ 2008 FoodLog Web
- ◆ 2010 FoodLog Web Large Scale
- ◆ 2013 FoodLog App v1
- ◆ 2016 FoodLog App v2
- ◆ 2018 FoodLog App v3 → ◆ 2018 FoodLog Athl
- ◆ 2019 FoodLog Athl
for Dietitian*

Food Record Assisted by Image Recognition

v.1 2013.7

v.2 2016.5

v.3 2018.6

FOODLOG FOR SMARTPHONE

- M. Ogawa, Y. Sato, K. Aizawa, "Foo.Log.Inc—Counting Calories with Your Camera," Health2.0, 2011;
- K.Aizawa et al, Comparative Study of the Routine Daily Usability of FoodLog: A Smartphone-based Food Recording Tool Assisted by Image Retrieval, Journal of Diabetes Science and Technology, 2014
- S.Horiguchi, K.Aizawa et al, "Personalized Classifier for Food Image Recognition, IEEE Trans. Multimedia 2018

FoodLog v.3

Photo,
food region

- Personalized Food Recognition
- Visual Search in Personal History

Image based assistance

Partial text
or keyword

- Associative Search
- Text Search
- Web Search

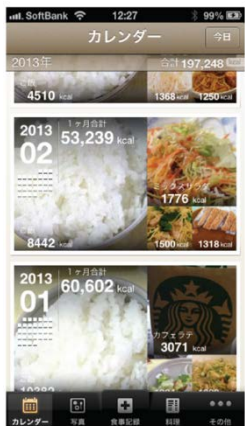
List of Candidates,

- Selection
- Volume
- *Free text input if necessary

Text based system

Update the
Personal
History

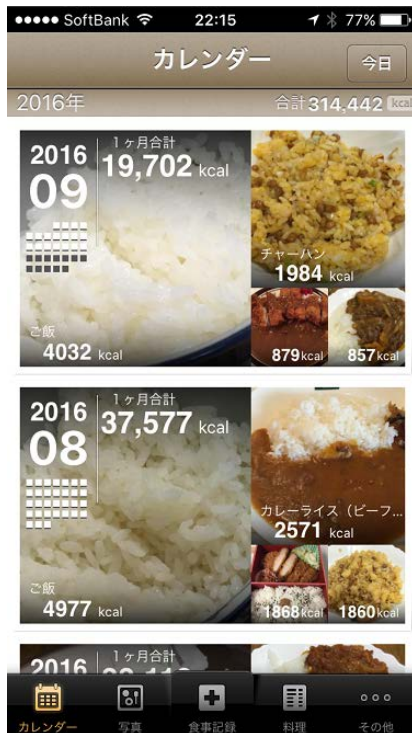
Food
Record



FoodLog App v.1

◆ FoodLog app (launched July 2013)

- visual search (within personal data)
- text search
- free text input



FoodLog App v.2

◆ FoodLog app (updated May 31 2016)

- food/non-food image detection
- food recognition
- visual search (within personal data)
- associative search
- web search
- text search
- free text input

FoodLog App v.3

- ◆ FoodLog app (updated June 2018)
 - food/non-food image detection
 - food region detection
 - multiple food recognition in a photo
 - visual search (within personal data)
 - associative search
 - web search
 - text search
 - free text input



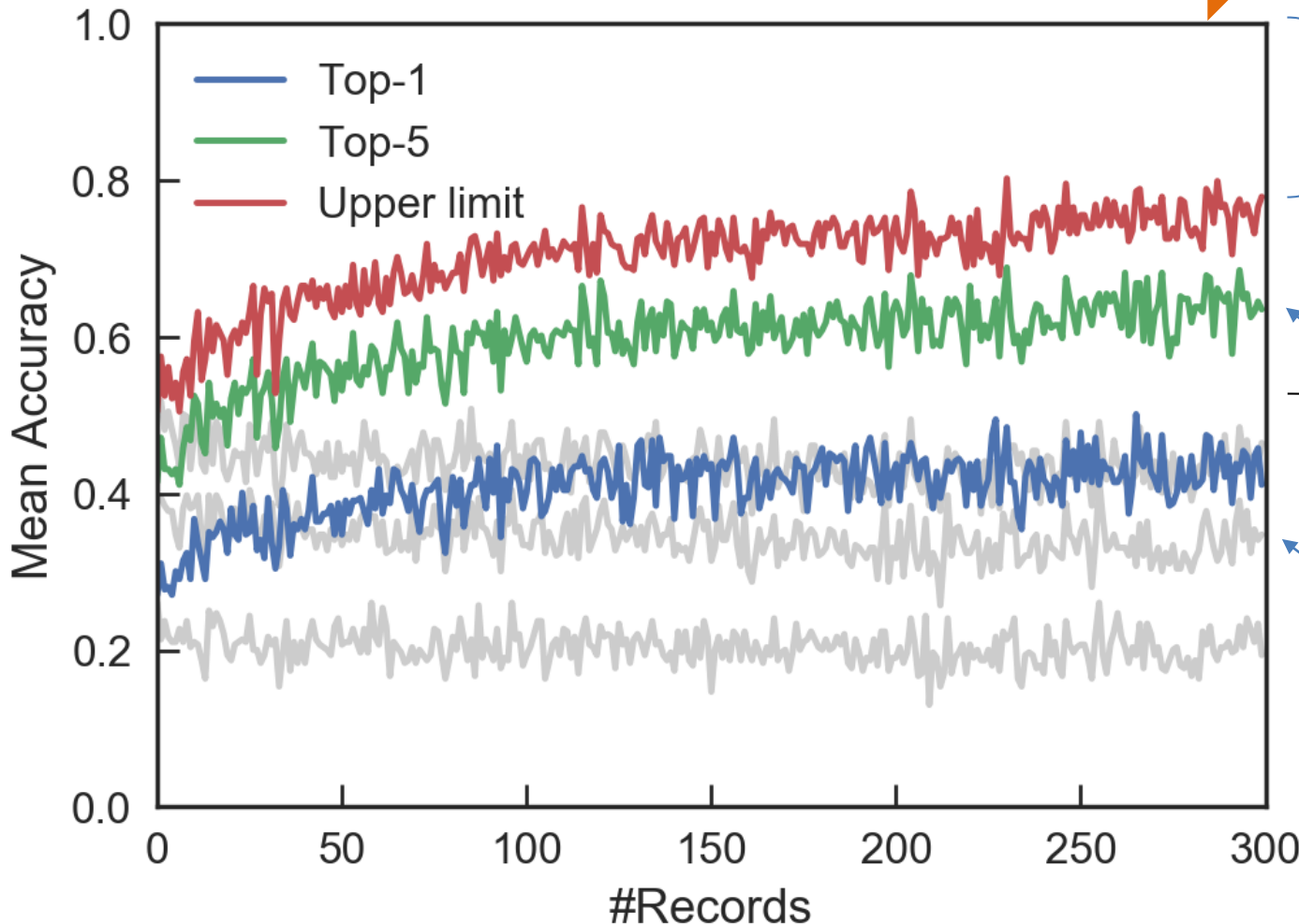
Personalized Recognition

Horiguchi, Aizawa, et al,
IEEE T-MM, 2018

Evaluation using
real data stream

Accuracy improvements by
learning user's inputs sequentially

299 Users
300 records



Ratio of users
who have "new"
to common and
personal repository

$\frac{\# \text{ of top 5 correct users}}{\# \text{ of total users}}$

Top5, CNN without
personalization

Collaboration with our Univ. Hospital: Self Control Assistance Tool For Diabetes

DialBetics assisted by FoodLog

[DialBetics] 2型糖尿病患者自己管理支援システム

Vital
Signs

Exercise

Food



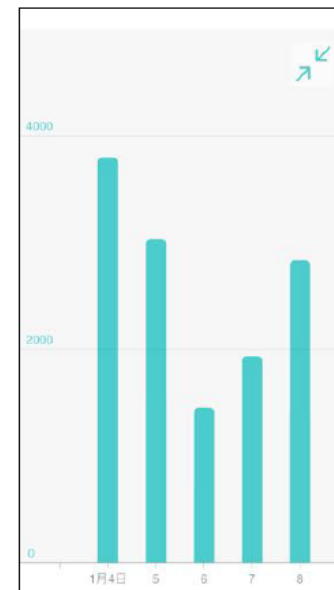
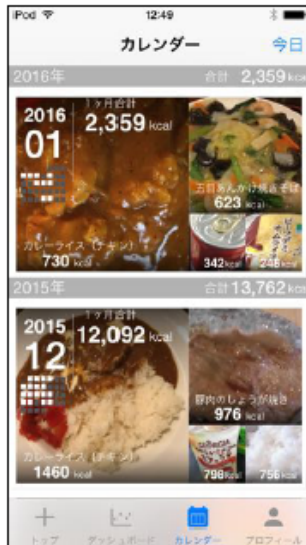
K.Waki, K.Aizawa, et al,

(東大・健康空間情報学講座) <http://uhi.umin.jp>

Journal of Diabetes Science
and Technology, 2015

FoodLog

Gluco Note (Univ.Tokyo Hospital, Mar. 2016)



FoodLog Athlete (FLA)

FLA Launched Dec. 2018

FLA Dietitian, Soon

H.Karasawa, K.Aizawa, et al., 2019
M.Kawarada, K.Aizawa, et al., 2019

A System Useful for Dietitians

FoodLog Athlete



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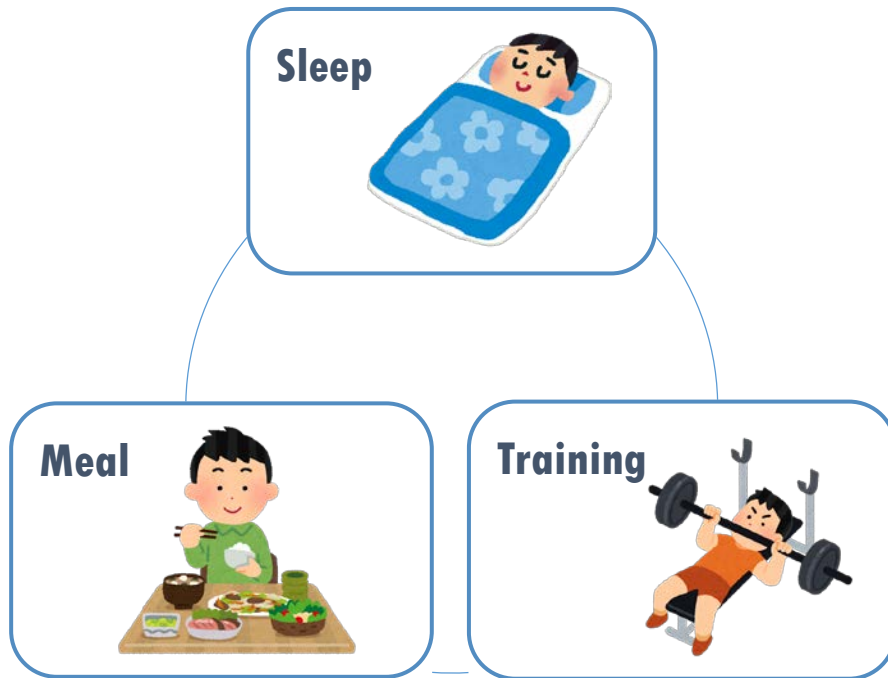
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Body building is the most important for athletes



[1]



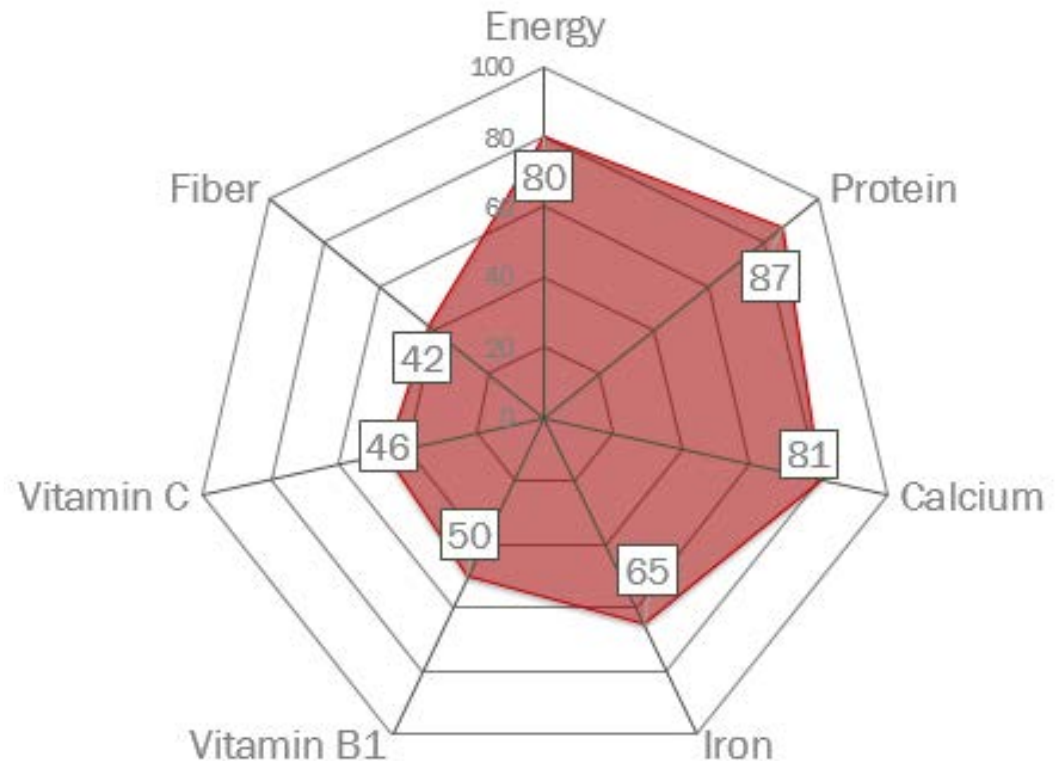
[2]

[1] KOJI MUROFUSHI Official Website, <http://www.kojimurofushi.net/>

[2] WE ARE TEXANS, <https://www.houstontexans.com/>

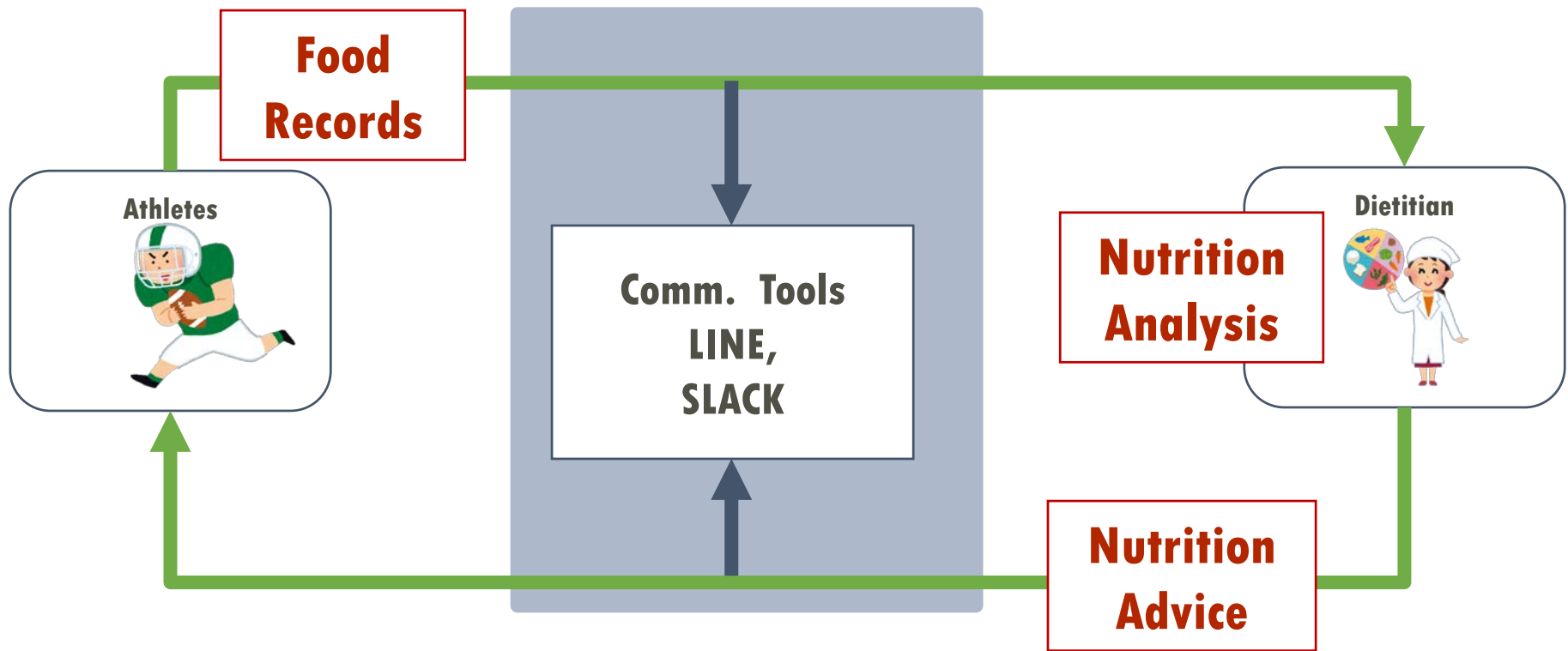
Student Athlete's Nutrient fulfillment rate in Athlete Standard^[3]

Their dietary intake is far below the athlete standard.



[3] 武部礼子+: '学生アスリートのための組織的食育改善と食環境整備の構築', 大学行政研究, vol.3, pp.93-104, 2008

Communication bwn Athletes and Dietitians -Now-



LINE: similar to WhatsApp, which is the most popular messaging tool in Japan

Support Dietitians' Nutrition Management of Athletes

Based on our interviews of dietitians who are certified sports nutritionists

Athletes :

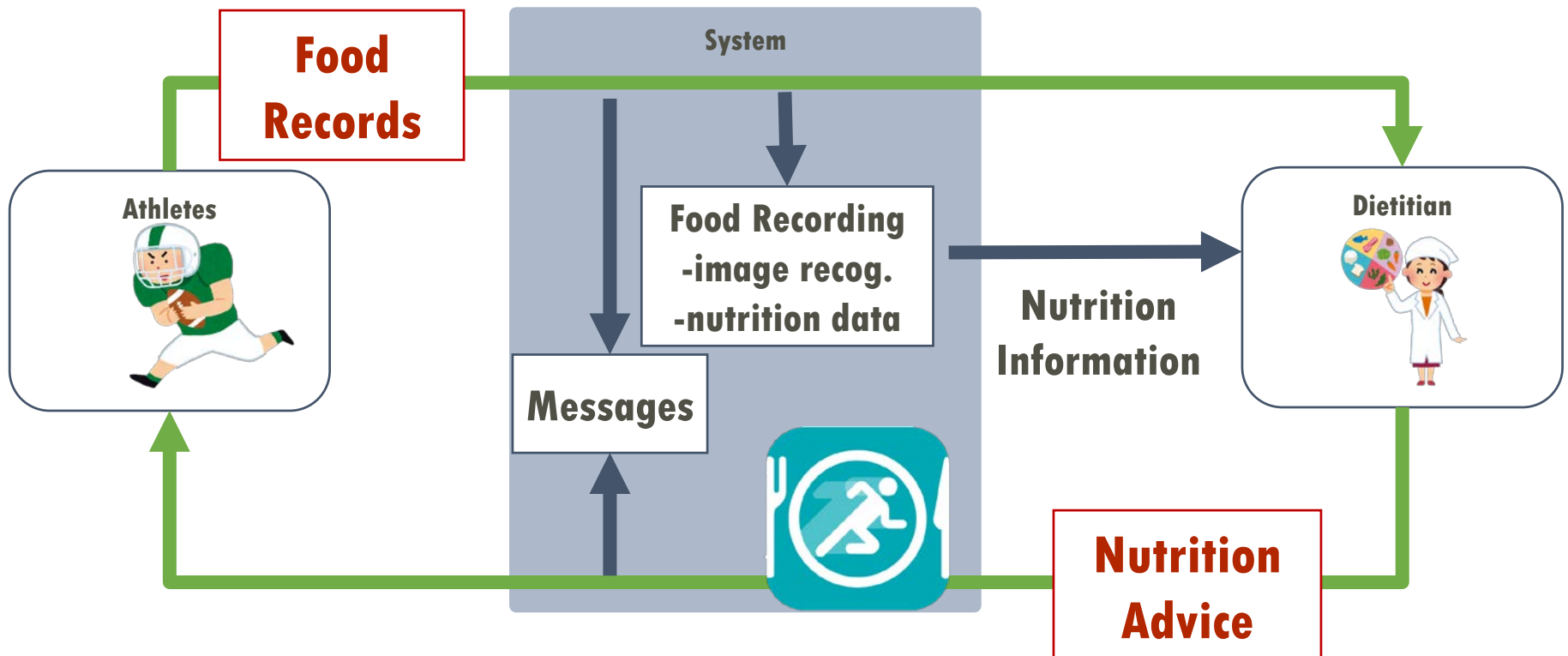
- Share food photos with a dietitian.
- Display daily nutrition intake
- Messaging to/from a dietitian
- Food nutrition data includes food product

Dietitian :

- Review of several to dozens of athlete information (name, body composition) etc.
- Create nutrition guidance messages with viewing food photos and records of the athlete.
- Create reports consolidating food records and messages.

Support Athletes and Dietitians

- Communication bwn Dietitians and Athletes
- Food recording tool for Athletes
- Viewing tool for Dietitian



Functions

- **API of the existing FoodLog: Food image recognition, Food record database**
- **Messaging bwn athletes and dietitians**
- **Food nutrition data (Eat Smart Inc.)**
 - **General food data app. 2000**
 - **Food data of services and products app. 140,000**
- **Food Recording Method**
 - **Food image recognition, text search, barcode search**
 - **No user defined food name**
- **Display of food recording and nutrition summary**
- **Body weight and some customized items.**
- **Download food records of individuals.**

Dietitian PC screen

The screenshot displays a dietitian's PC interface with several key sections:

- Top Left:** User profile for 管理太郎 (Manager Taro).
- Top Center:** Athlete profile for 側島真太郎 (Sidejima Makihito), 19 years old, with fields for body composition, weight, height, and position.
- Top Right:** Target values (目標) table for macronutrients and energy.
- Left Side:** Athlete list (Athlete list) showing a list of athletes with their names and university affiliations.
- Center:** Messages (Messages) section showing a conversation with the athlete regarding fat intake.
- Right Side:** Food Log (Food recording) section showing a log entry for January 19th, including a photo of food and a table of nutritional values.

Item	Value
たんぱく質 (Protein)	186.0 g
脂質 (Fat)	87.0 g
炭水化物 (Carbohydrate)	744.0 g
エネルギー (Energy)	4500 kcal

Item	Value
コーンポタージュ 1人前 (Corn chowder 1 serving)	たんぱく質 35.0 g
牛乳パック(500ML) 1本 (Milk pack 500ML 1 pack)	脂質 30.8 g
かしわ餅 4個 (Kashiwa mochi 4 pieces)	炭水化物 169.6 g
	エネルギー 1090 kcal

Messages:

側島君、こちら返信しそびれておりごめんなさい><
今のところ、目標までは脂質はあまり意識しなくて良いです！

脂質はどのくらいに抑えたほうがいいですか？ 18:18

1月23日

あり
意識しよ

Food Log:

1月19日 土曜日 9:28

920 kcal, 1662 kcal, 685 kcal, 536 kcal, 1065 kcal, 146 kcal

Jan.20, less than 4000 calories.

- Food supplements that can take protein such as meat buns, egg sandwiches, hot dogs, etc. from 15:00 to 16:00
 - Before going to bed, take dairy or protein
 - Fruit or 100% juice should be taken
- Please add this much.**

App for Dietitian



Trial Use

- **10 athletes of American Foot Ball Club of the University and a certified sports dietitian of Dome Corp.**
- **1 st phase: Dec. 2018**
 - **10 athletes x 1week**
- **2 nd phase: Mid Jan.– End Mar. 2019**
 - **10 athletes**
 - **Strengthening physical**
- **In the trial use, we did debuging, added functions.**

Comments from the Dietitian

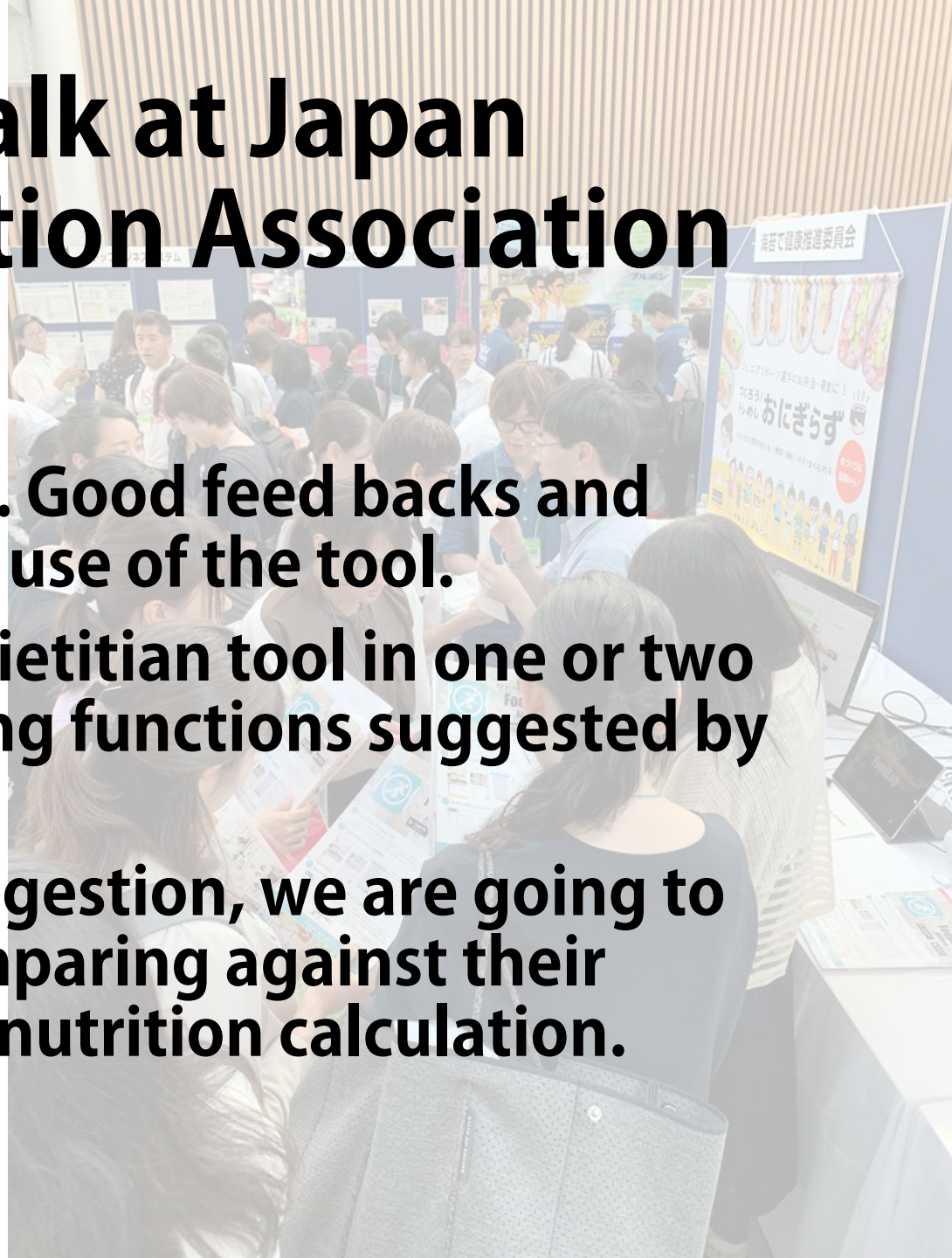
- **“No need to calculate nutrients for each food”**
- **“No need to produce a report by saving my interactions”**
- **“Easier to look back the food records of players”**

Comments from athletes

- **Please improve the accuracy of the food recognition system.**
- **I thought it was troublesome to correct the results of wrong recognition.**
- **I thought it would be good to make the item name.**
- **System bugs need to be fix.**

Demo and Talk at Japan Sports Nutrition Association

- **Aug. 23-25, 2019**
- **Very well received. Good feed backs and strong requests of use of the tool.**
- **Plan to open the dietitian tool in one or two months with adding functions suggested by them.**
- **Based on their suggestion, we are going to verify the tool comparing against their traditional way of nutrition calculation.**



Conclusion

- **Short survey of our works for multimedia food recording.**
- **By changing focus onto support of athletes and dietitians, we created a new tool –FoodLog Athlete.**
- **Introduced the new things of FoodLog Athlete.**
- **The new tool is more focused on the use of Dietitian.**
- **We will verify it collaborating with certified sports dietitians.**