



iManageCancer



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Results of a European R&D Project on
Empowering Patients and Strengthening
Self-Management in Cancer Diseases

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VIENNA

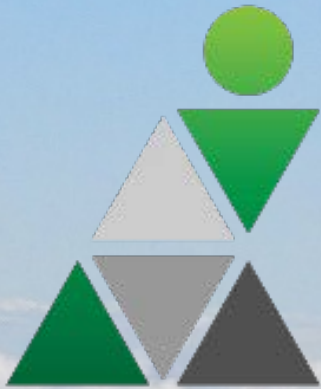
MASCC/ISOO
ANNUAL MEETING
SUPPORTIVE CARE IN CANCER



Faculty Disclosure

X	No, nothing to disclose
	Yes, please specify:

Company Name	Honoraria/ Expenses	Consulting/ Advisory Board	Funded Research	Royalties/ Patent	Stock Options	Ownership/ Equity Position	Employee	Other (please specify)



iManageCancer

EMPOWERING PATIENTS AND STRENGTHENING SELF-MANAGEMENT IN CANCER DISEASES



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This presentation reflects the authors' view.

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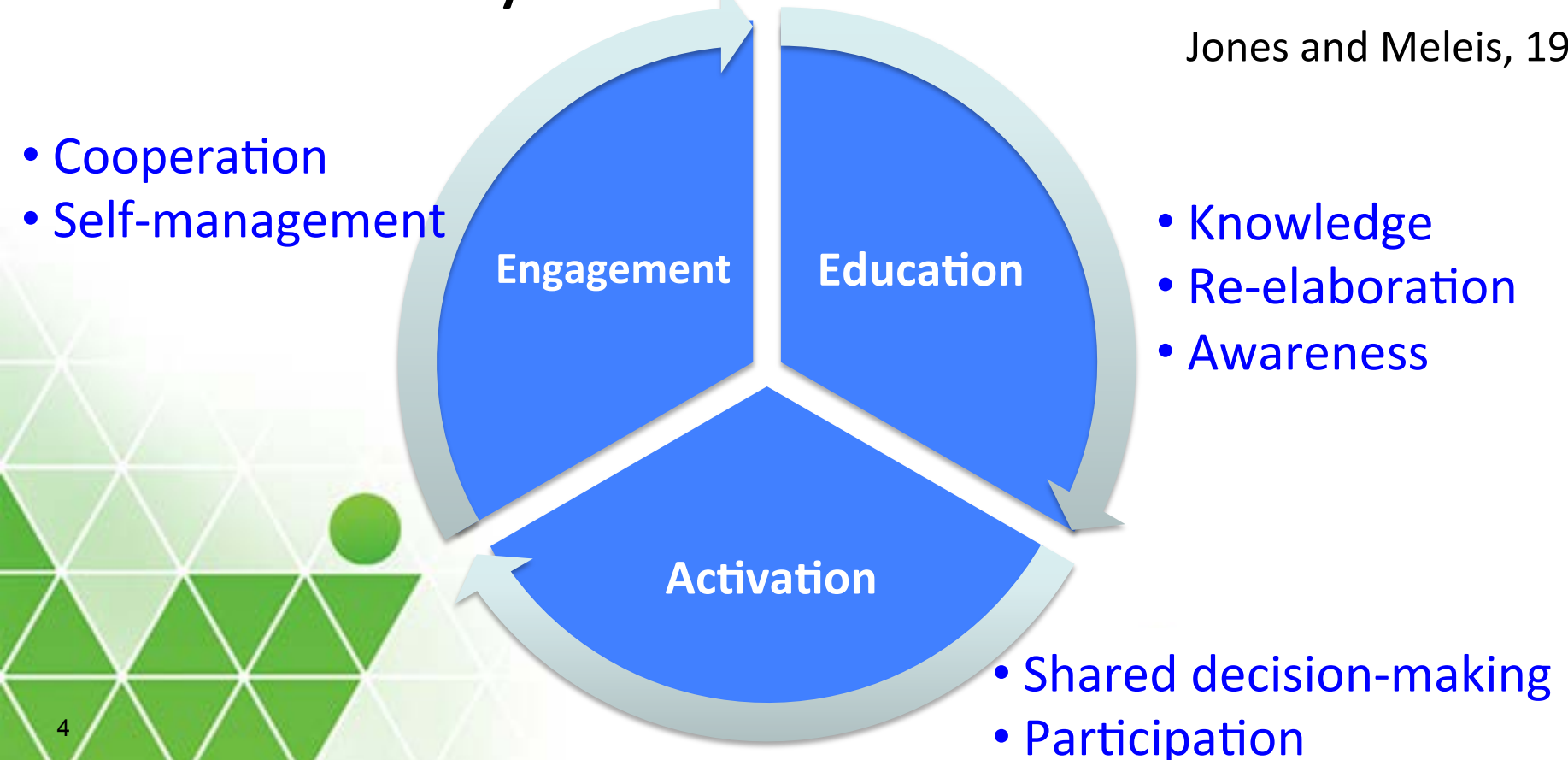
2/2015 – 7/2018
<http://imanagercancer.eu/>

Motivation: Cancer as a chronic disease

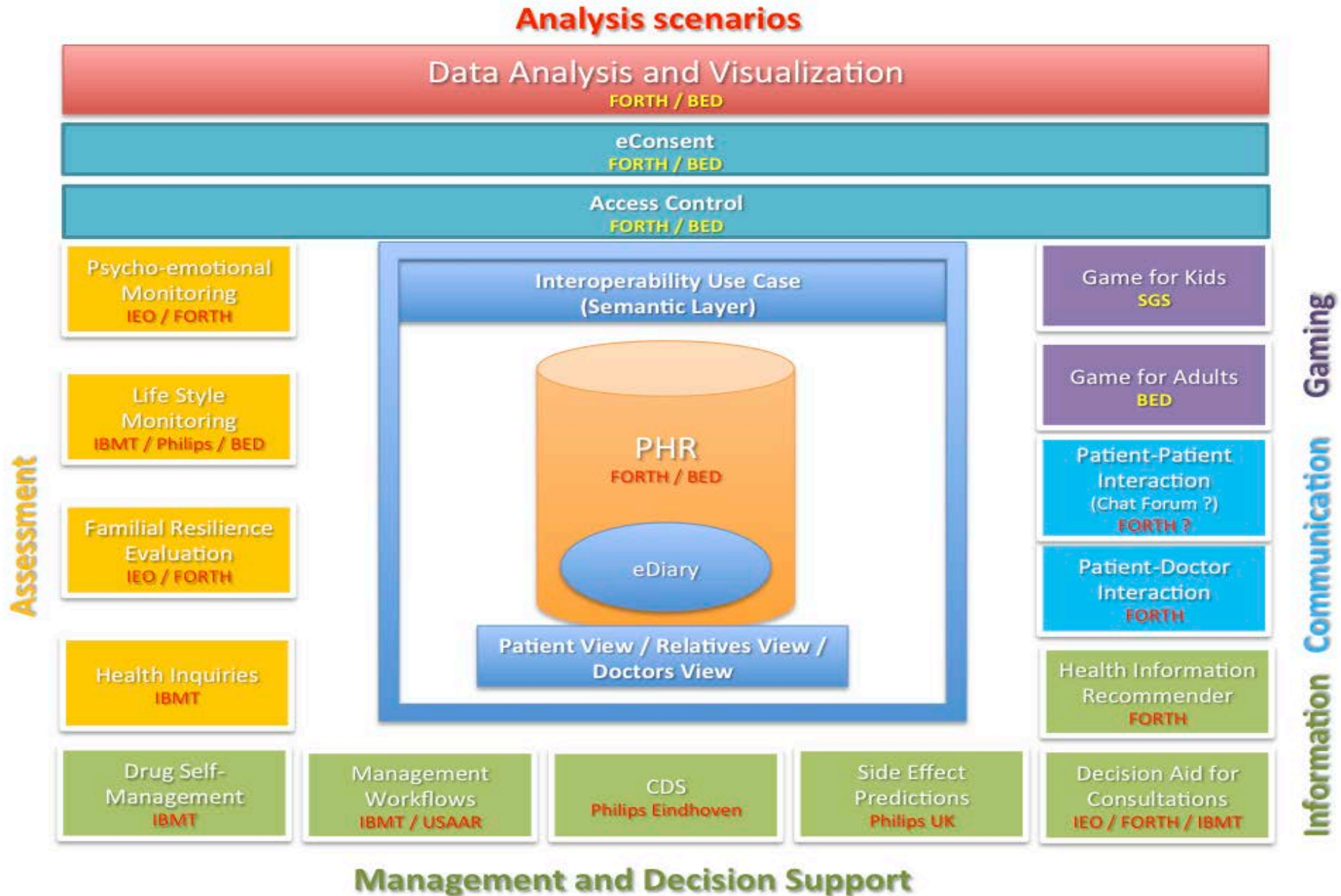
Patient empowerment

“Social process of recognizing, promoting, and enhancing people’s abilities to meet their own needs, solve their own problems, and mobilize necessary resources to take control of their own lives”

Jones and Meleis, 1993



Use Case scenarios



Features

mHealth platform to support cancer patients and their relatives

- Cancer specific PHR and eDiary
- Drug management and drug safety
- Intelligent information services and decision aids
- Management support for pain, fatigue and psycho-emotional resilience
- Predictive models for side-effects during chemotherapy
- Serious games for kids and adults to educate and motivate



iManageCancer Platform (1)



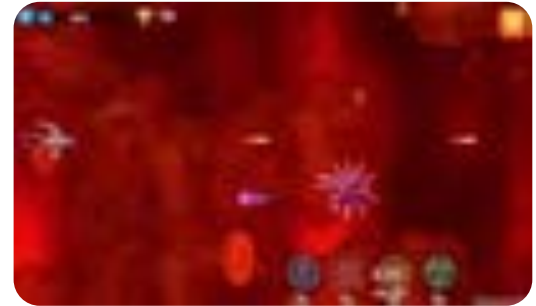
Game for Adults

Manage your health city



Game for Kids

Kill the cancer cells with the help of your social network



iPHR

Intelligent personal health record and e-diary

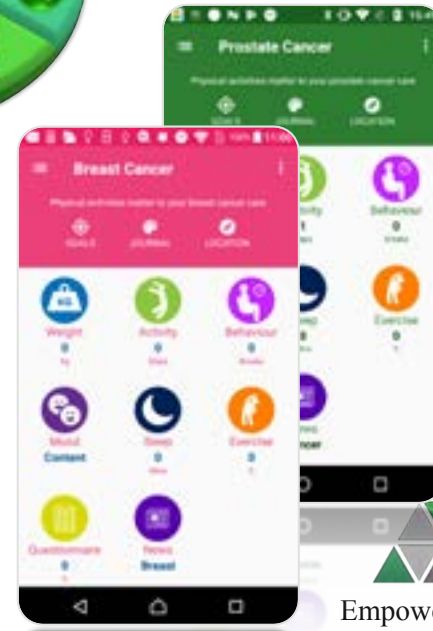


iManageMyHealth

Managing drugs, drug safety, vital signs, lab values, pain and fatigue



MyHealthAvatar
Monitoring and managing lifestyle



iManageCancer

Empowering patients and strengthening self-management in cancer diseases

iManageCancer Platform (2)



Visual Analytics

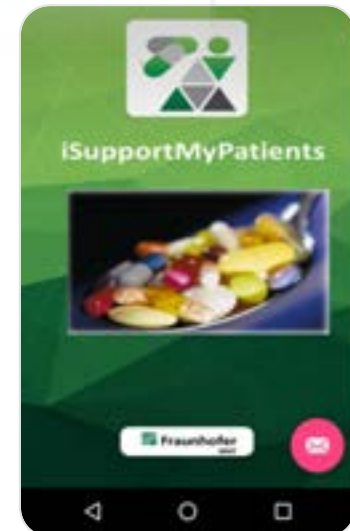
for patient cohorts with e-consent and de-identification tool



id	name	date	status	description	action	date
1	John Doe	2023-01-01	Active	Initial assessment and treatment plan	View	2023-01-01
2	Jane Smith	2023-01-02	Completed	Follow-up appointment and medication review	View	2023-01-02
3	Michael Johnson	2023-01-03	Pending	Referral to specialist and further testing	View	2023-01-03
4	Sarah Brown	2023-01-04	Completed	Discharge planning and home care instructions	View	2023-01-04
5	David Wilson	2023-01-05	Active	Regular monitoring and symptom management	View	2023-01-05

Care Flow Engine and Model Repository

Care flows and predictive decision support for patients and doctors



iSupportMyPatients

Data sharing with the physician and predictive patient management

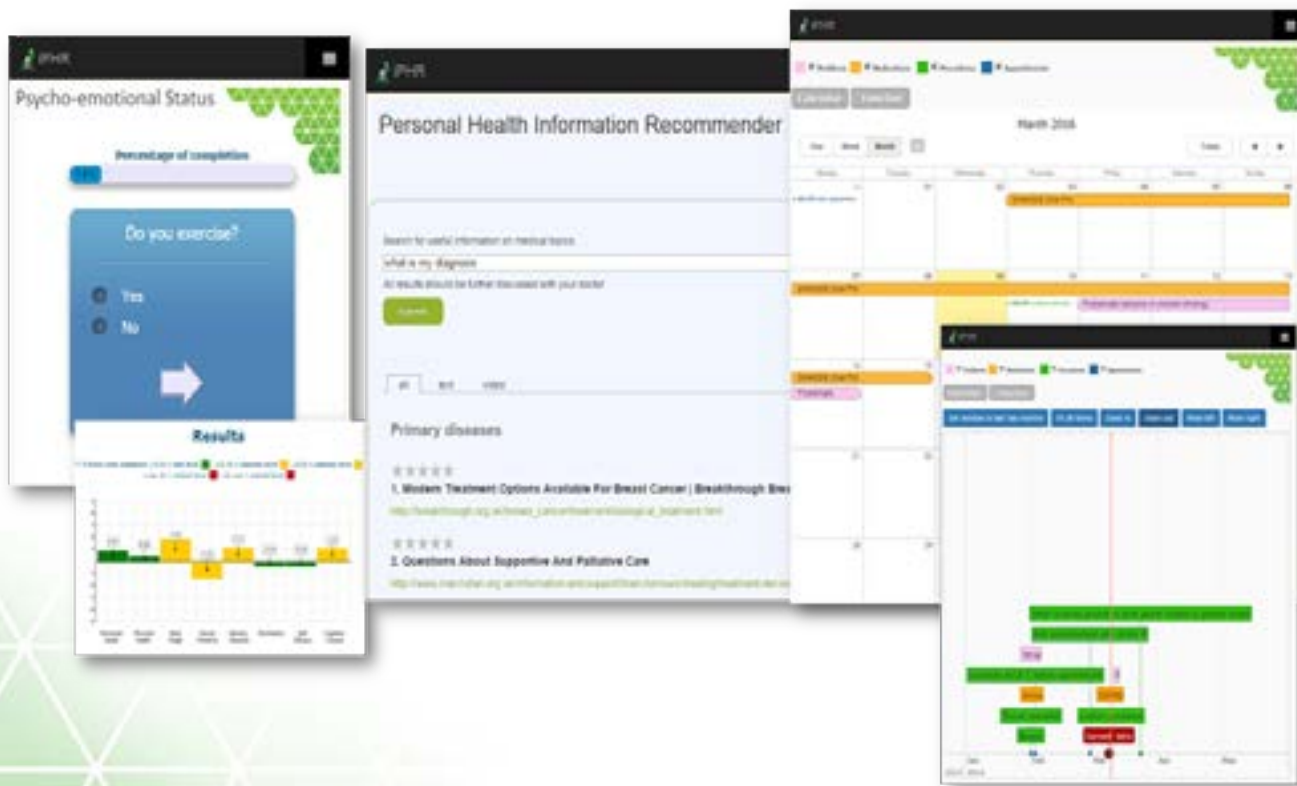


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Empowering patients and strengthening self-management in cancer diseases

iPHR

Enabling an individual to own and manage a complete, secure, digital copy of their health information



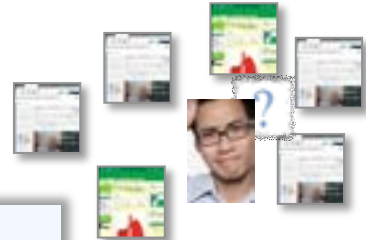
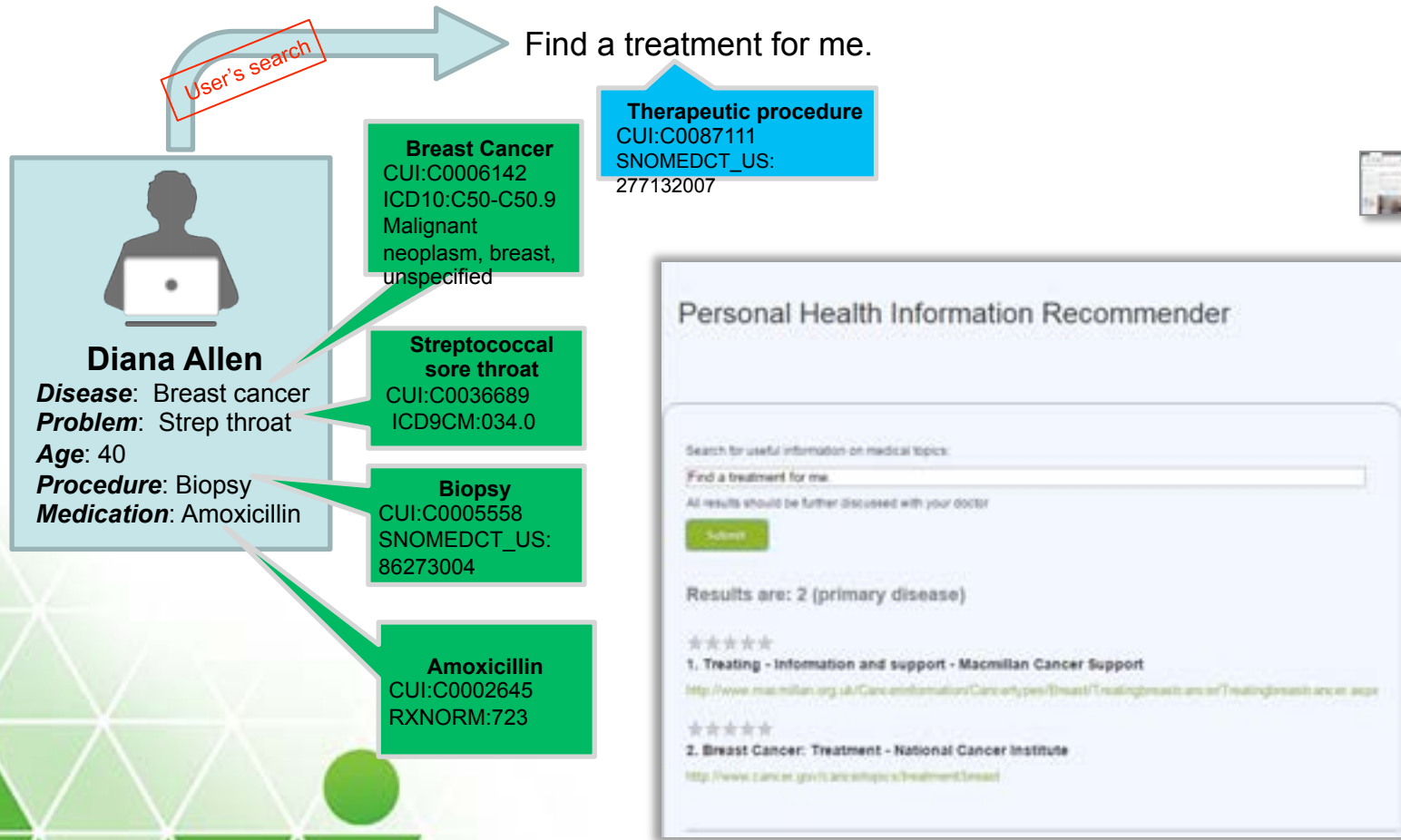
PHR applications:

- eDiary
- Problems
- Demographics
- Allergies
- Medications
- Laboratories
- Procedures
- PHIR
- Measurements
- Appointments
- Profiler
- ALGA-C
- Contact
- Export RDF/XML
- Bulk import

Some of the iPHR apps (from left to right: psycho-emotional status, profiler, personal health information search engine, e-diary)

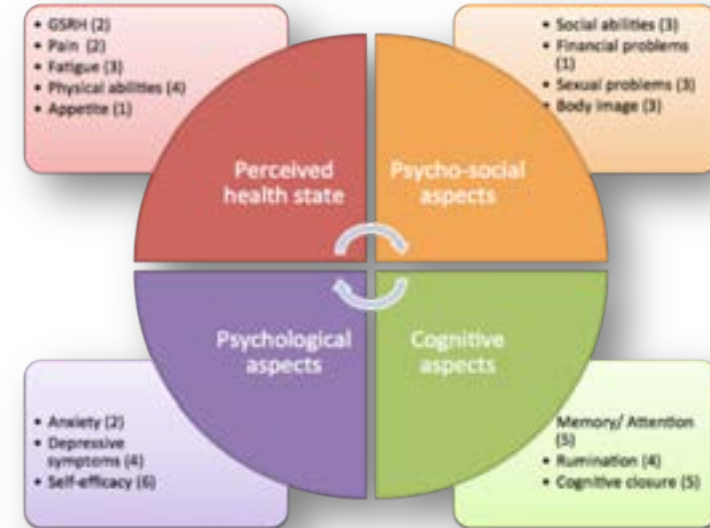
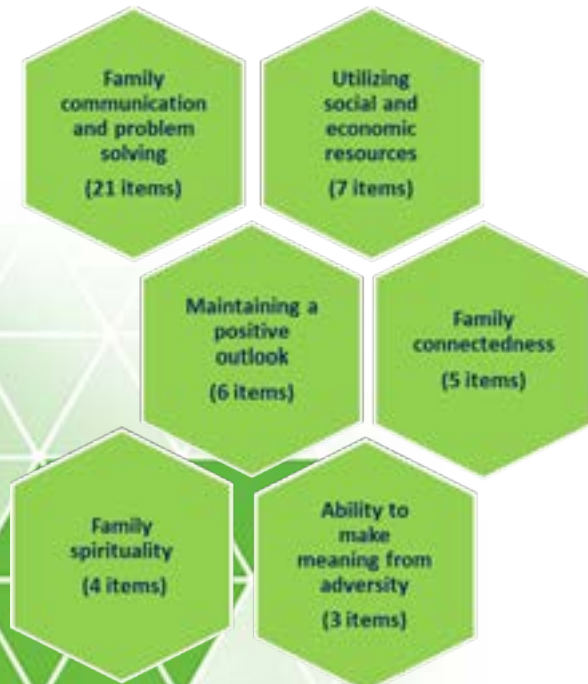
Personal health information recommender

Smart access to cancer related content for information and education



Novel questionnaire based electronic tools to empower cancer patients

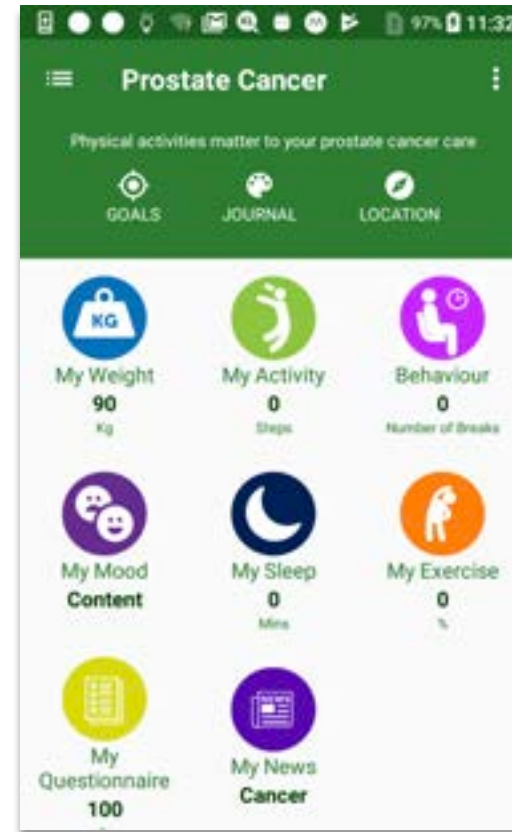
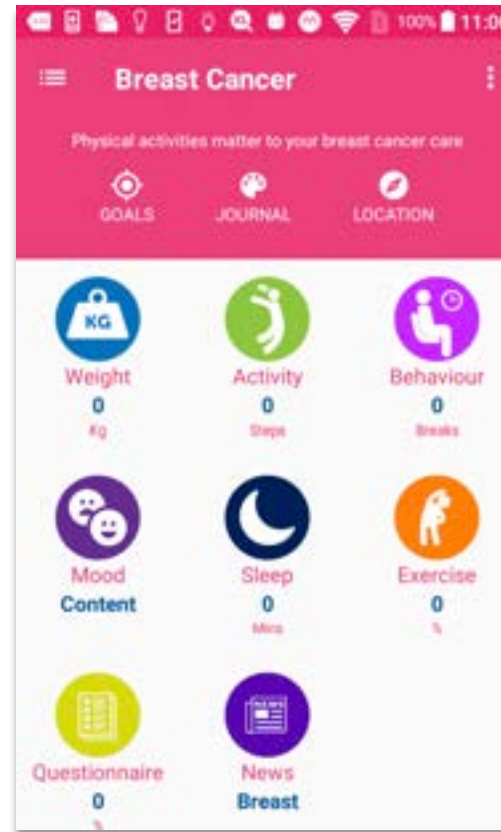
- ▶ Psycho-emotional status monitoring based on extended ALGA-C questionnaire
- ▶ Family resilience evaluation tool
- ▶ Decision aid to support patient's participation in consultations



MyHealthAvatar

Promote healthy lifestyle and support patients in achieving their health goals

- Goal setting
- Health program and education
- Measure & detect the quality of life change
- Focus on prostate cancer and breast cancer



iManageMyHealth App

Support patients in managing their drugs and their paper based health information

Services:

■ Drug management

Easy creation of a medication plan with reminders for drug intakes.
Recording of outcome and side effects.

■ Drug safety

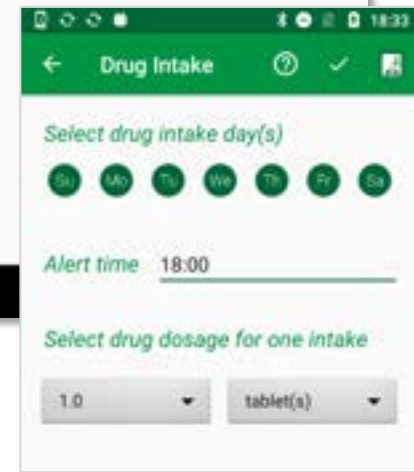
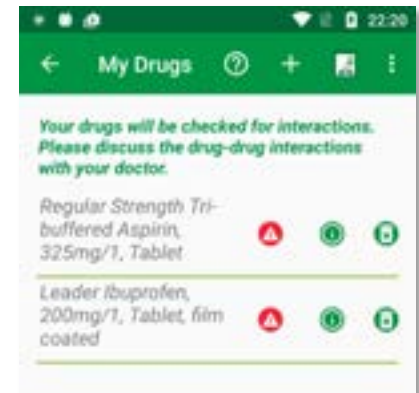
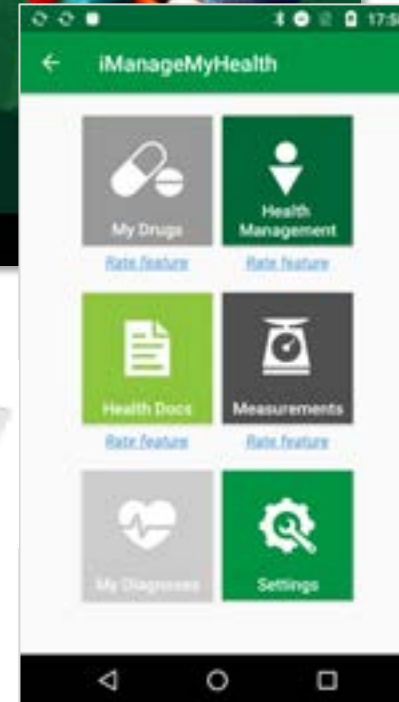
Check for contra indications and drug-drug interactions

■ Document management

■ Vital sign monitoring

■ Specific management services

Pain, fatigue, ...



Empowering patients and strengthening self-management in cancer diseases

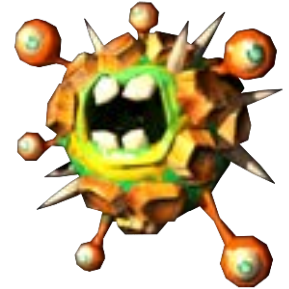
Serious games to fight cancer

Game for children:

- Shooter game where the child fight against its own cancer cells
- Support from friends and relatives through a strong social component

Main objectives

- ▶ Aid with psycho-emotional support
- ▶ Let the child focus on the right enemy, the cancer cells
- ▶ Let the child learn about its disease
- ▶ Raises the child's acceptance of the treatment
- ▶ Measure & detect the quality of life change



Serious games to fight cancer

Game for adults:

► A lifestyle management game

The user will balance available activities in order to increase their avatars happiness while managing symptoms and treatments. The game's purpose is **education** in healthcare.

► Gameplay is based on achieving goals using a mobile device's click and drag interface. The user will play through a number of scenarios containing management challenges, completing challenges will allow progression to the next scenario and earn rewards.

► The users can draw parallels between their avatars improvements and their own real life.

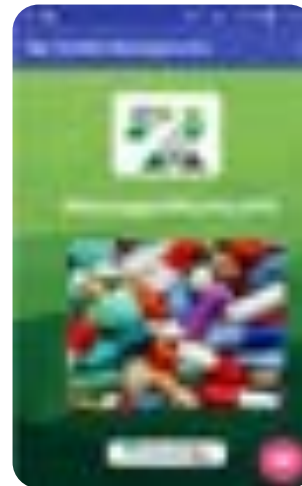


Decision Support Framework



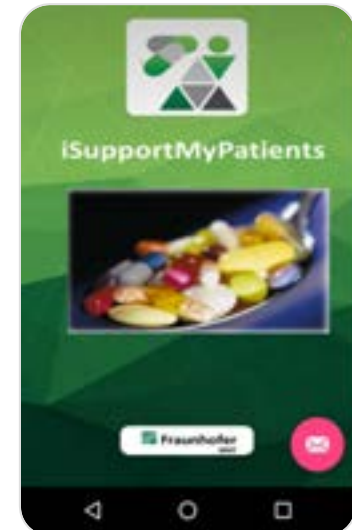
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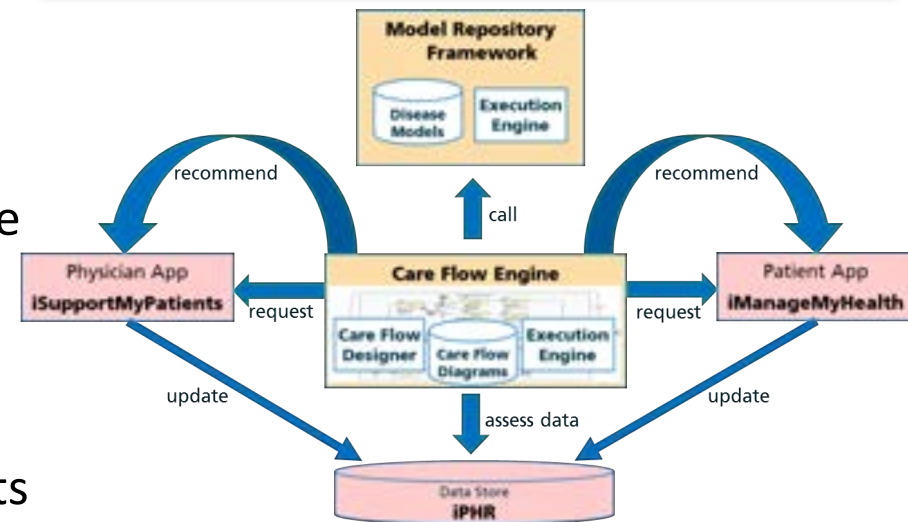
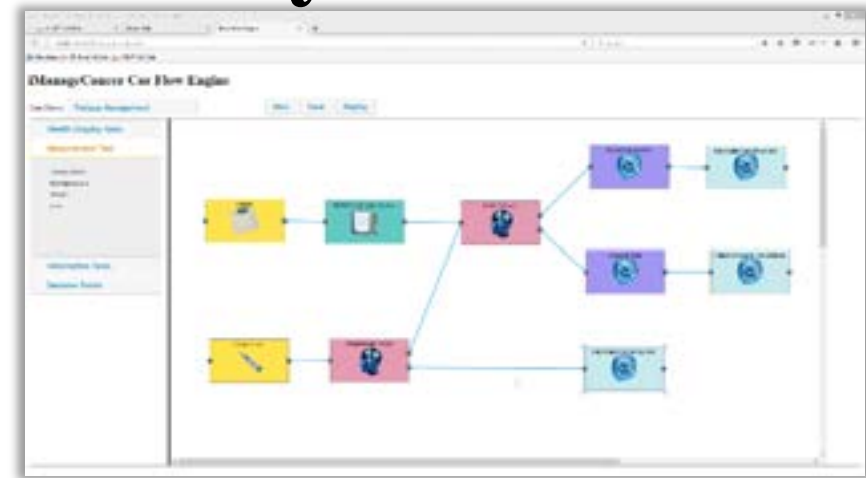


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Empowering patients and strengthening self-management in cancer diseases

Guidance to manage side effects and therapy with patient pathway models

- ▶ Care Flow Engine analyses recorded data, detects health problems and provides individualized support.
- ▶ Care Flow Engine executes workflows (processes) within the system that involve patients and doctors.
- ▶ Clinical expert can design a formal management workflow for a specific therapy related problem (i.e. fatigue management, pain management) that the system will execute.
- ▶ Models for side effect prediction (i.e. neutropenia) can be included in the management workflows at decision points



Decision support for chemotherapy monitoring

Current Scenario

Cancer patient undergoing therapy in hospital setting and then recovers at home

Patient develops adverse event, such as fever (alarm for febrile neutropenia)

- Return to hospital setting (infection prone environment) for a blood test and if WBC (normally ANC and ALC) is low then there is possible G-CSF administration and antibiotic treatment.
- Fact: Cancer patients have a 30% higher risk in acquiring infections (neutropenic -> febrile neutropenia)

Adverse clinical outcome

- Impact on patient's Quality of life
- Frequently results in treatment adjustments: rescheduling, dose decrease (~25% lower than those approved in clinical trials)
- Unfavourable clinical outcome (i.e. tumour progression) with increased mortality rates

**Chemotherapy
- Close patient
monitoring**

- Thermometer (oral temp 38.5°C) & Blood cell count (ANC: $<0.5 \times 10^9$ cells/L)

**Predictive
algorithms**

- Broad data sets
- Multi-centre
- Multi-disciplinary expertise
- Statistical analysis



<http://bigdata.startupweekend.org/>

Proactive management
Scheduling of treatment

Cancer patient undergoing chemotherapy in hospital setting

Chemotherapy hospital/home monitoring (i.e. neutrophil counts, temperature monitoring) and model design

Reduced rescheduled therapies (favoured tumour outcome), increased survival and patient psychological status



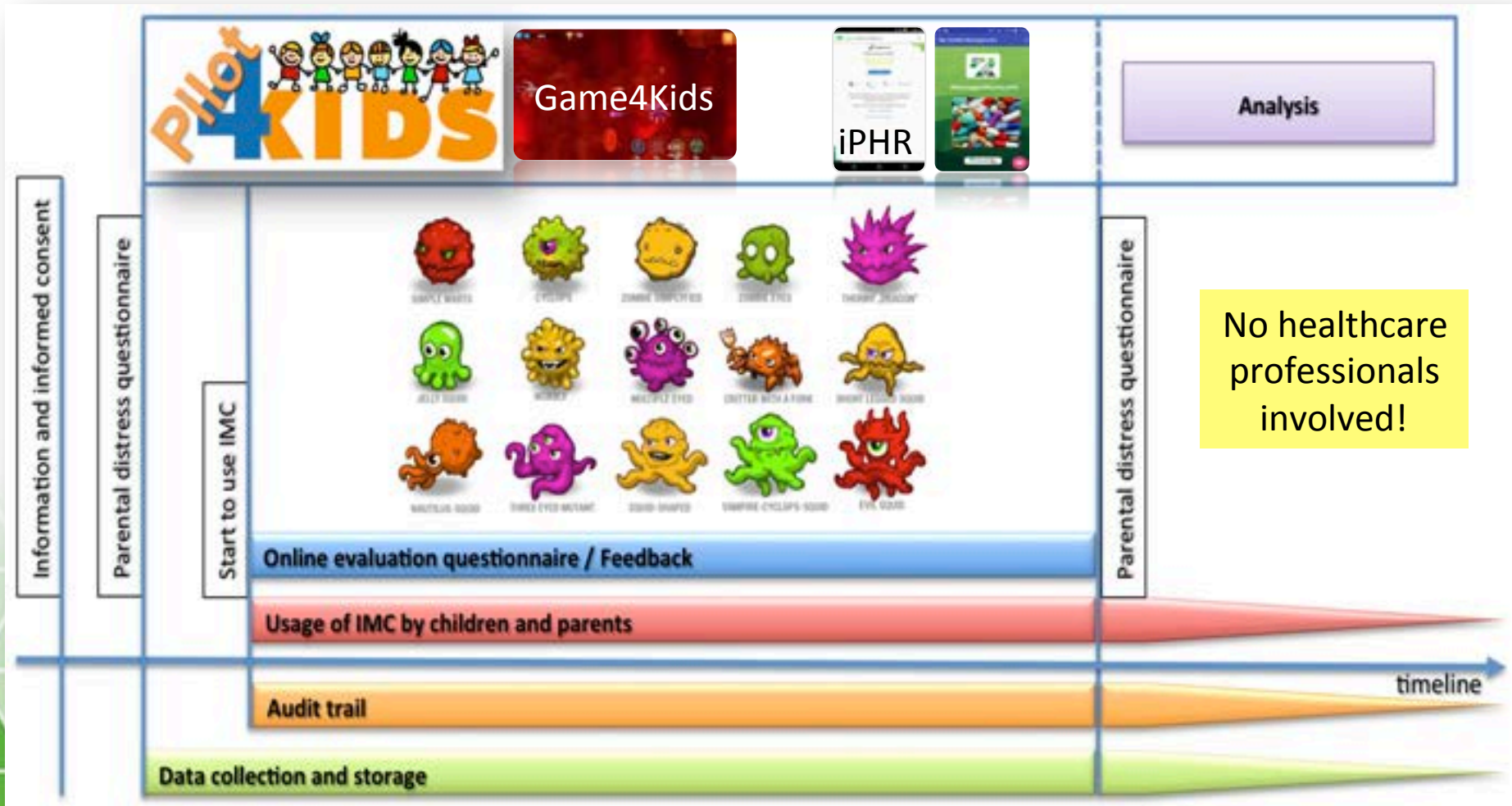
Focus: Febrile Neutropenia



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Pilot for children



Parental Distress Questionnaire (Dietrich et al 2014):

<https://obtima.org/alga-c/kids>

Faced obstacles

Parents had the following problems and concerns:

- Further stress with using such an IT tool
- Complaints that data need to be deleted after the end of the project
- They do not want that their children spend too much time with playing online games
- Fear that the game will cause stress for the children. They may feel that they are responsible if treatment fails because they don't play well enough or long enough
- Number of friends supporting their kids might be lower than in other children

Children showed the following problems:

- Under chemotherapy they just want to sleep in the hospital
- At home they want to play with their friends and not to think about their disease

20 After a while the game loses attractiveness

Pilot for adults

eHI (N=64)
Use of iManageCancer
platform

Breast cancer
patients (N=32)

Prostate
cancer patients
(N=32)

IM (N=64)
Informative Material
on a paper format

Breast cancer
patients (N=32)

Prostate
cancer patients
(N=32)

No health
professionals
involved!



Baseline
Patient Health
Engagement Scale
(*main endpoint*)
Resilience Scale
for Adults
Mini – Mental
Adjustment to
Cancer
Profile of Mood
States

6-8 weeks

eHI
> use of the
platform

IM
> standard
care

T1
Patient Health
Engagement Scale
(*main endpoint*)
Resilience Scale
for Adults
Mini – Mental
Adjustment to
Cancer
Profile of Mood
States
Usability
assessment (only
for eHI group)

T2
Patient satisfaction
questionnaire
Costs assessment

Intermediate results and issues faced

- Recruitment rate 46.5%
- Difficulties using the apps (bugs, technological literacy)
- Lack of time and interest in the apps
- Stress
- Lack of indication on how much time to dedicate
- Perceived usefulness of the platform is low in prostate cancer patients
- Women found the monitoring features useful (exercise, sleep, mood, etc) as well as the post surgical physiotherapy exercises.
- Patients appreciated search engine: provision of reliable information

Conclusions and lessons learned

- Comprehensive mobile platform for cancer patients provided
- Usability is a major key to success. KIS principle.
- ‘One-size-fits-all’-approach does not work for cancer
- Readiness of patients to use health apps
- The value of the tools is much higher if the clinicians are in the loop
- Standardized clinical guidelines required to advice patients how to cope with monitored findings



Acknowledgements



Questions?

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 643529.

