DIGITALLY ASSISTED PLANNING AND MONITORING OF SUPPORTIVE RECOMMENDATIONS IN CANCER PATIENTS

Research work from the EU H2020 Project *ONCORELIEF*

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Project *ONCORELIEF*

Title

- A digital guardian angel enhancing cancer patient's wellbeing and health status improvement following treatment

Partners

- Care Across Ltd (UK), Centre for Research and Technology Hellas (GR), EXUS Software Ltd (UK), FCiências.ID (PO), Fraunhofer-Gesellschaft (DE), Innosystems Ltd. (GR), Istituto Scientifico Romagnolo per lo Studio dei Tumori (IT), Maggioli Spa (IT), MCS Data Labs GmbH (DE), Universita di Bologna (IT), University Medical Center Mainz (DE), Suite5 Ltd (CY), Time.Lex (BE)

Funding

- EU H2020 - Health, demographic change and wellbeing - Digital transformation in Health and Care

Duration

- 01/2020 – 12/2022

Motivation

Challenge

- 18.1 million new cancer cases and 9.6 million cancer deaths in 2018
- Many options for cancer therapy, but some with severe impact on patients' wellbeing
- Strong need for follow-up patient care, but limited available ressources

Solution approach

- Patient-centered AI-based digital environment for follow-up care
  - Data acquisition about patient's health status with mobile application and wearable sensors
  - AI-based data analysis and recommendation planning with web application by health professional
- Exemplary disease patterns of colorectal cancer and acute myeloid leucemia

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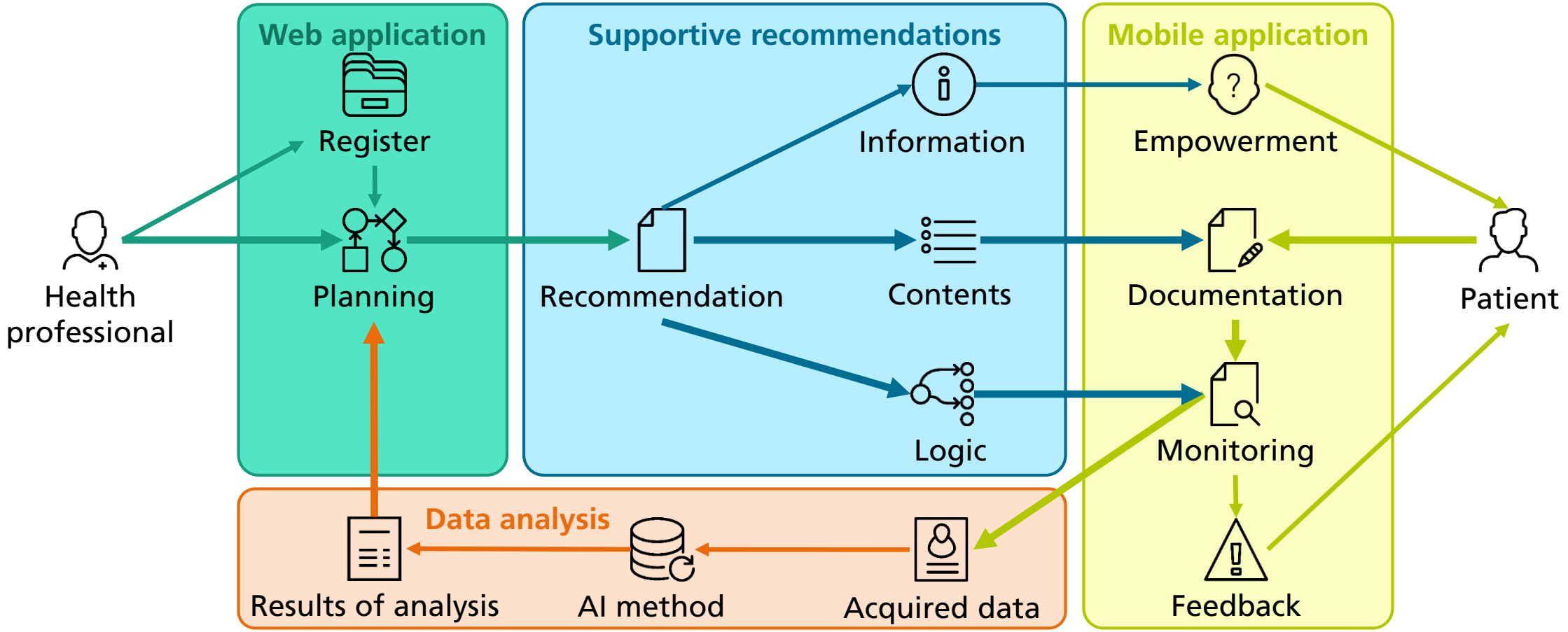
General solution concept



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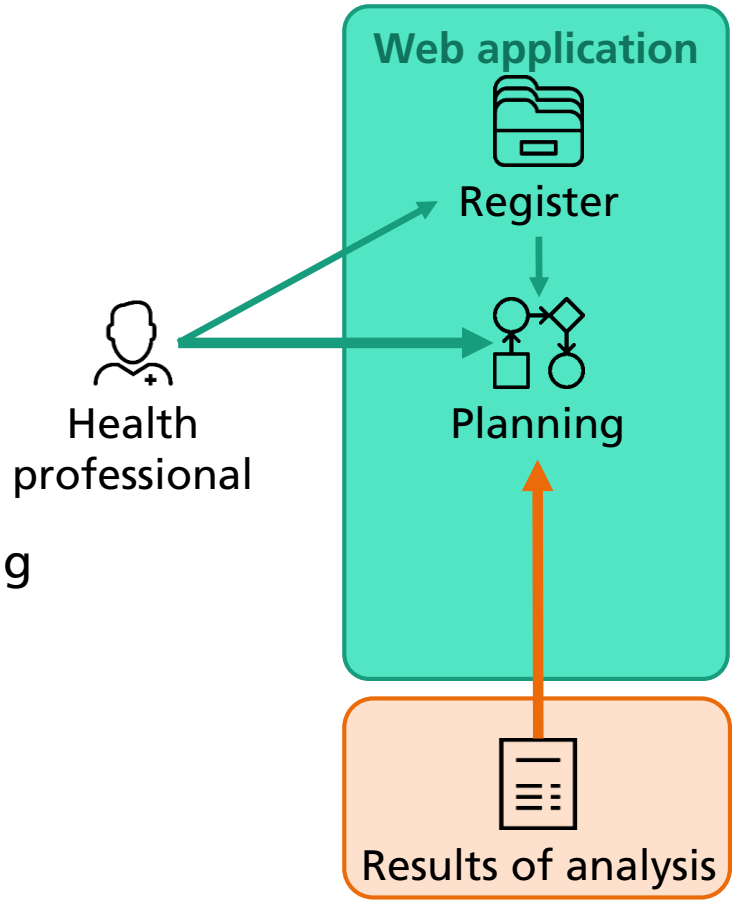
Web application

Results of AI-based data analysis

- Choice of AI method specific to considered disease pattern, acquired patient data and available options for supportive care
- Generic data interface of planning module to AI method

Register of supportive recommendations

- Specification of available recommendations with parameter structure, visualization and accessibility information and monitoring conditions
- Easy registration by file import



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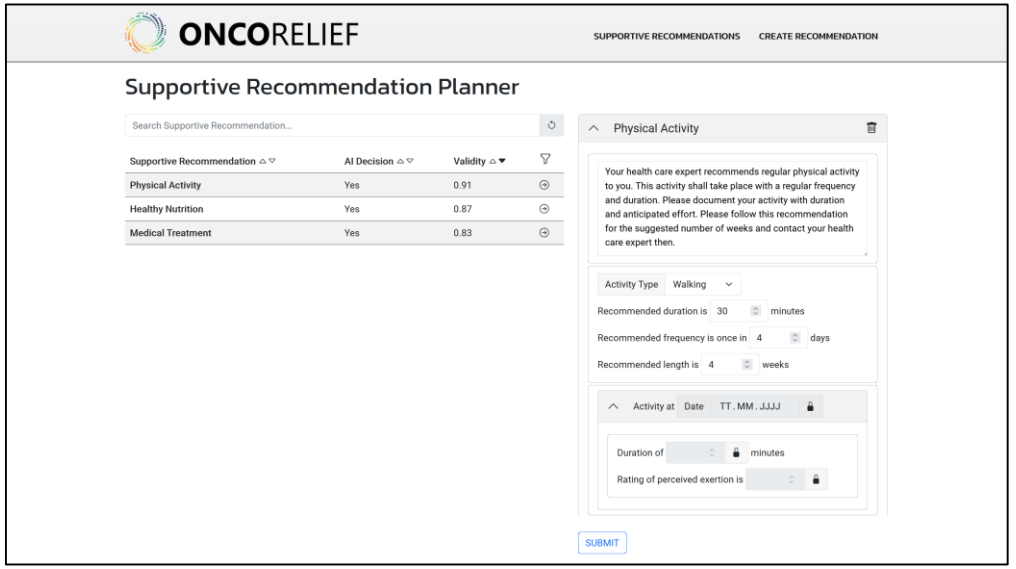
Web application II

Exemplary case and results of data analysis

- Patient with colorectal cancer suffering from anxiety, depression and fatigue
- Analysis with Random Forest method with AI decisions and validities as outcomes



Register of supportive recommendations

- 24 supportive recommendations for disease pattern

Selection and adaptation of recommendations

- Selection by sorting and filtering operations on names and results of analysis
- Adaptation by suitable entries of parameter values followed by transfer to mobile application

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Recommendations

Parameter structure

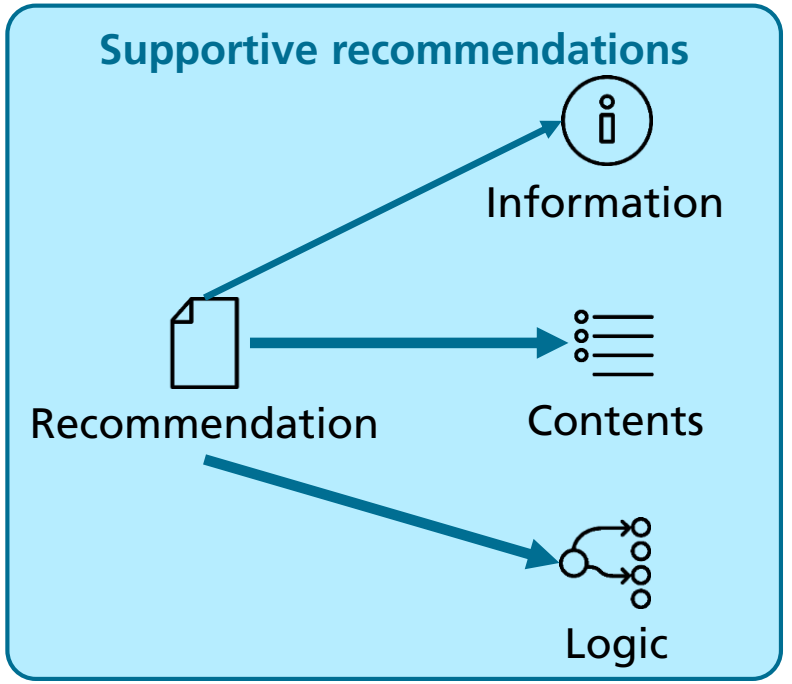
- Specification of recommendation parameters with identifier, value type, value range, etc.

Visualization and access

- Parameter labels, type of initialization and accessibility by health professional or patient

Monitoring conditions

- Logical conditions on recommendation parameters, text descriptions and optional quality scores
- Easy adaptation of monitoring conditions by suitable modification of parameter values



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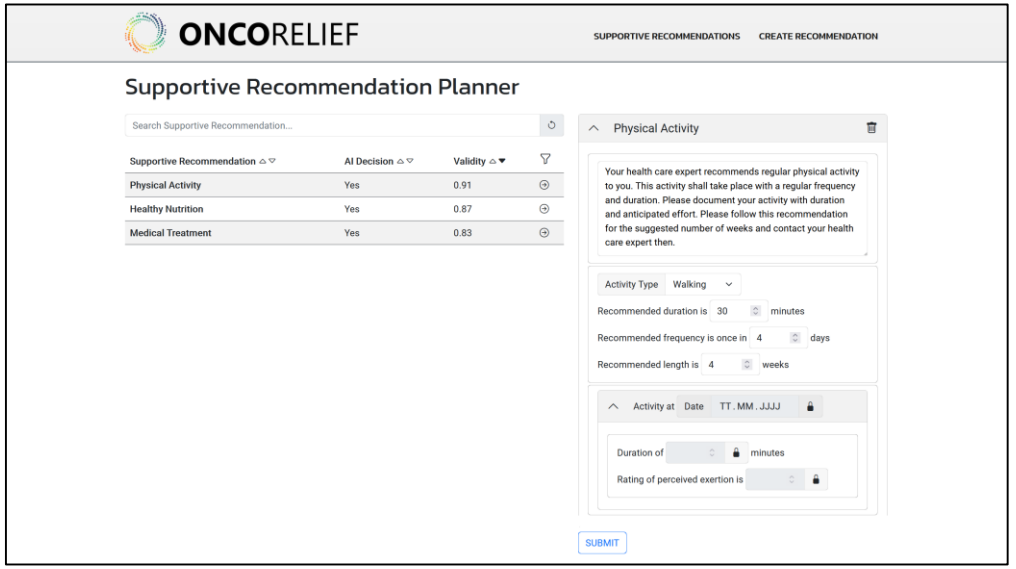
Recommendations II

Exemplary parameter structure and visualization

- *Physical activity (root node) {*
  Activity type (ordinal, once, professional)
  Frequency recommendation (integer, once, professional)
  Activity entry (node, arbitrary, patient) {
  Activity date (date, once, patient)
  Duration (integer, once, patient)
  }
  }



Exemplary monitoring condition with quality evaluation

- *(NOT (EXISTS (Activity entry) FULFILLS ((Activity entry).(Activity date) GREATEROREQUAL ((CURRENT DATE) MINUS (Frequency recommendation)))))*
- *(Evaluation ASSIGN Bad)*

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Mobile application

Configuration of the mobile application

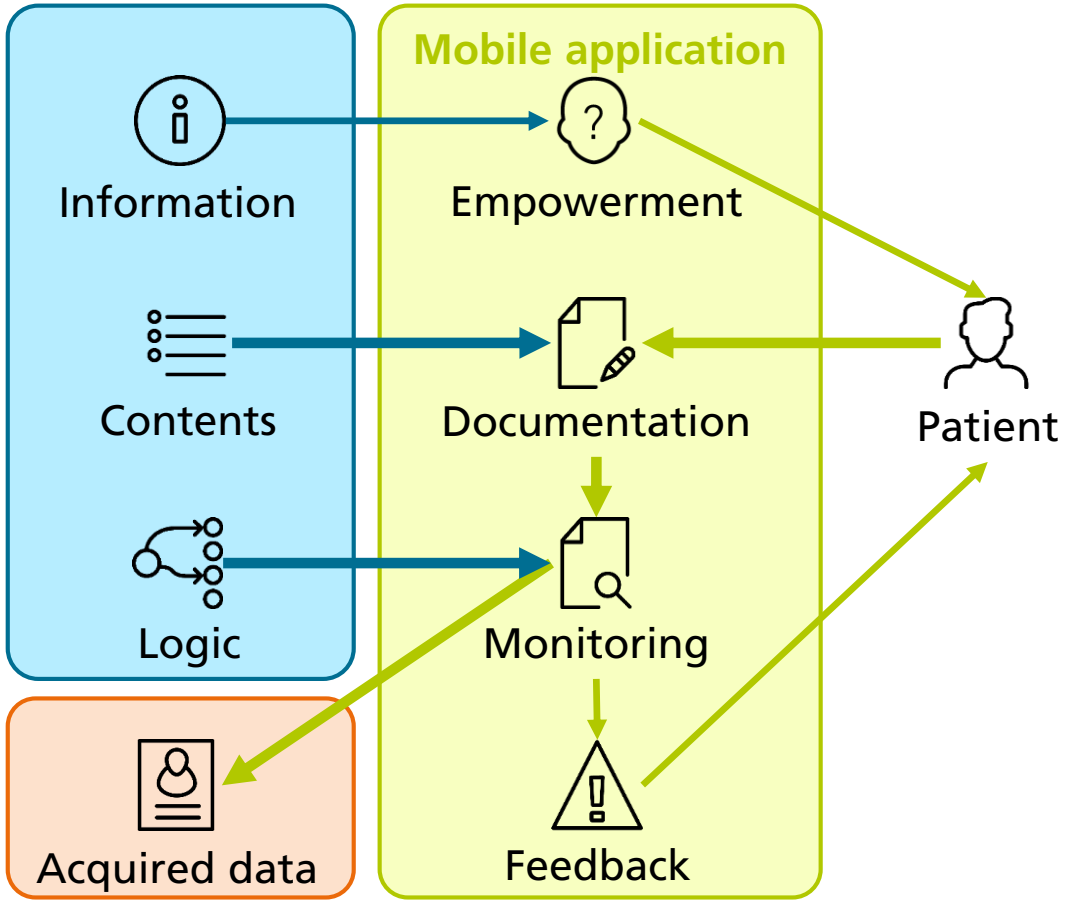
- Upload of files from web application

Documentation of recommendations

- Value entries form predefined value ranges for accessible parameters by patient

Monitoring of recommendations

- Automated computation of logical conditions after every edit
- Display of quality evaluations and text messages to patient



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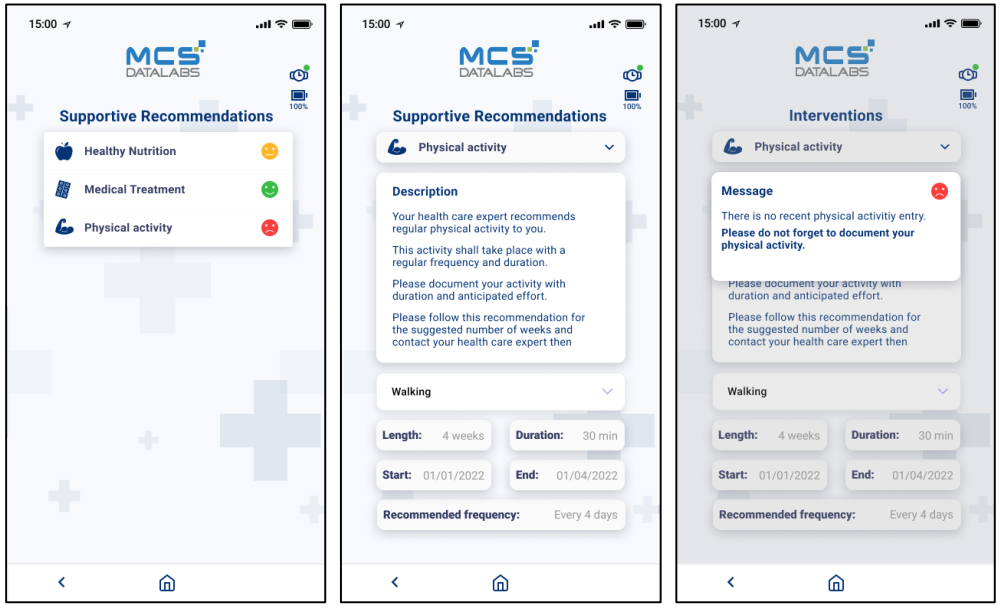
Mobile application II

Configuration of the mobile application

- Individualization according to patient's needs by upload of suitable recommendations



Documentation of recommendations

- Easy documentation with values suited for later AI-based data analysis

Monitoring of recommendations

- Digitally assisted guidance of patient according to requirements of health professional

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Conclusions

Workflow

- Comprehensive technological support for closed-loop workflow with separate connected components

Methods

- Division-of-labor approach with automated data analysis and search for recommendations and manual supported recommendation planning by health professional

Health care

- Close patient support with safe AI without permanent involvement of health professionals

Thank you very much for your attention! I'm looking forward to your questions.

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