



## BD2Decide

### Big Data and models for personalized Head and Neck Cancer Decision support

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This document should be distributed as guidance to all the personnel of BD2Decide Consortium partners involved in the project execution.

### *Revision History*

Revision no.	Date Issue	of Author(s)	Brief Description of Change
1	31.08.2017	F. Mercalli, S. Copelli (MME)	Finalized version

### *Addressees of this document*

This document presents the diverse materials that are intended to support the Project communication plan and strategy, as presented in deliverables D9.2 and D9.3.

The deliverable is the second revision of deliverable D9.5 and it will be revised again at M32 (third release, D9.7) in order to take into account additional insights, obtained during the course of project.

This document will be delivered to the European Commission.



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### *Abbreviations and definitions*

CA	Consortium Agreement
DoA	Description of Action, Technical Annex I to the Grant Agreement
EC	European Commission
EU	European Union
GA	Grant Agreement



## ***Executive summary***

This document – the second one of a total of three releases – presents the dissemination materials implemented to date, aimed at supporting the Project’s communication and dissemination strategy, as established in deliverables D9.2 [4] and D9.3 [5].

In particular it describes in details the Project’s logo, slide presentations template, social network accounts, leaflet, newsletters (including format and editorial plan), and the overall structure of a video presentation to be implemented when relevant information from Project implementation activities will be available.

The implemented materials are all available online and/or in electronic form. It will be up to the Consortium to decide if some of them (e.g. leaflet, newsletters) will need to be transposed on paper, according to the different dissemination opportunities that will be identified during the course of the Project.

## **Changes from previous version**

The following changes have been implemented with respect to the previous release of this deliverable (i.e. deliverable D9.5 [6]):

- Section 1 (Rationale for the dissemination materials): minor updates
- Section 2 (Project Logo): no changes
- Section 3 (Slide presentations template): no changes
- Section 4 (Project social network accounts): minor updates
- Section 5 (Project leaflet): minor updates
- Section 6 (Project newsletter format and editorial plan): update of editorial plan in order to wait for the availability of more rich information (in particular, on IPDA) for the creation of the newsletter issues and inclusion of the first issue
- Section 7 (Project video presentation): update of editorial plan in order to take into account relevant marketing needs for the video implementation



## 1 RATIONALE FOR THE DISSEMINATION MATERIALS

The BD2Decide communication strategy, illustrated in deliverables D9.2 [4] and D9.3 [5] needs to be supported by relevant dissemination materials, in order to reinforce and substantiate the messages that the Project will publish externally.

This deliverable, which is the second of a total of three releases (the first one, D9.5, has been released at M8, and the third one, D9.7, is due at M32), presents the set of such materials, as it has been elaborated to date.

In particular, it comprises the following elements:

- Project Logo
- Project presentations template
- Project social network accounts
- Project leaflet
- Project newsletters, including format, editorial plan and first issue
- Project video presentation

The following sections illustrate each of these elements in detail.

## 2 PROJECT LOGO

Created by designers at ATC, the Project Logo – represented in Figure 1 – boldly projects the acronym of the action, through an assertive two-colors palette, reminiscent of the medical environment.

An outlined DNA segment, leaning on the first letter of the acronym, represents the “big data” foundation of the Project.

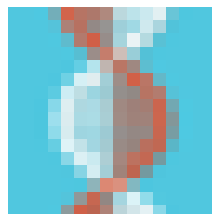
The logo is made available for all Project’s Communication activities in the following formats:

- Low resolution 285 pixel x 59 pixel, PNG format
- Low resolution 285 pixel x 59 pixel, PNG format with transparent background
- High resolution 1179 pixel x 237 pixel, EPS format
- High resolution 1179 pixel x 237 pixel, JPG format
- High resolution 1179 pixel x 237 pixel, PNG format with transparent background



**Figure 1. BD2Decide Logo**

The DNA segment outline is also employed as a 16 pixel x 16 pixel “favicon” for usage on webpages, as represented in Figure 2.



**Figure 2. BD2Decide favicon (enlarged)**



### 3 SLIDE PRESENTATIONS TEMPLATE

Based on the Project Logo, a slide presentation template has also been prepared.

This template shall be used for both:

- Presentations internal to the Consortium (e.g. during Consortium plenary meetings or Technical meetings)
- All presentation external to the Consortium (e.g. presentations at conferences, workshops, meetings with prospective users or customers, etc.)

This will help in promoting the consistency and uniformity of BD2Decide's communication actions and in reinforcing brand recognition.

In particular, the template proposes three different page "masters":

- Cover slide (see Figure 3): it includes the Project Logo, the presentation title, the name of the presenter and its function/organization, and the date/venue of the presentation
- Main content slides (see Figure 4): free hand is left to the presenter to decide the instance content (text, images, multimedia, etc.) in the frame of a mandatory structure, comprising a title and the bullet format for text content
- Final slide (see Figure 5): it comprises a concluding message, acknowledgment of the H2020 funding, the Project website URL and the QR Code to directly visit the website. From a communication point of view, this slide is very important for external presentations, as it reinforces:
  - the contribution from the H2020 Programme and, indirectly, the European scale of the BD2Decide endeavor
  - the invitation to obtain more information on the Project and get in contact with the Consortium, by highlighting the website entry point

The following figures visually illustrate the above described slides.



<presentation title>

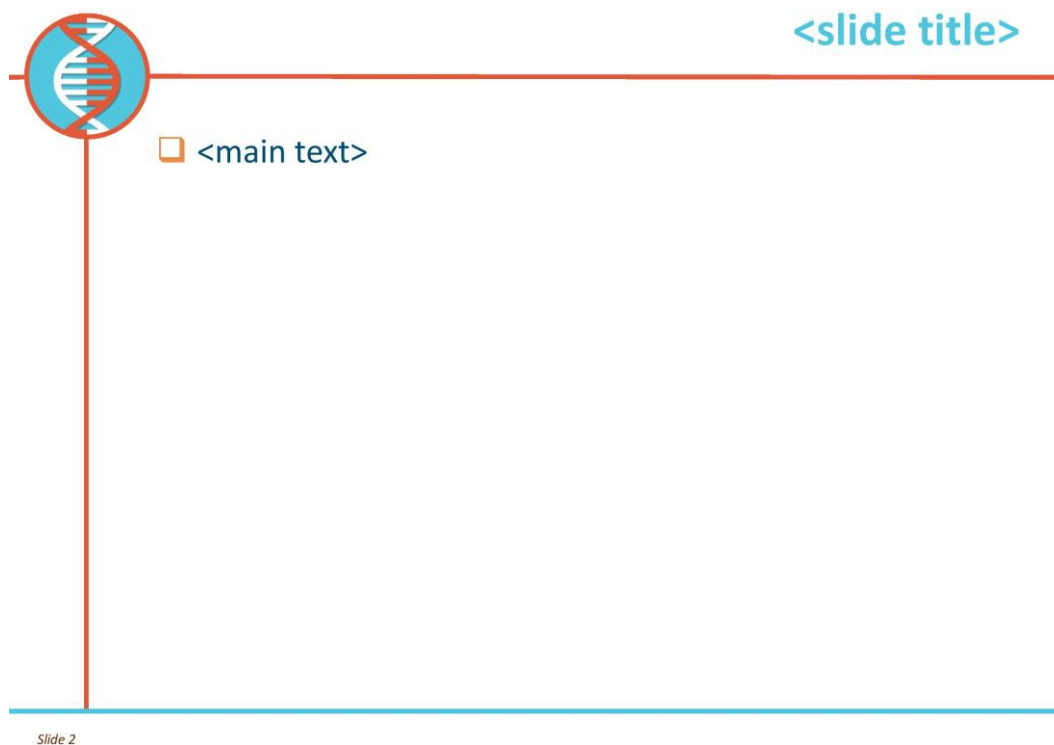
**Name of the presenter**

Function and Organisation

Date &

Venue

**Figure 3. BD2Decide presentation template: cover slide**



**Figure 4. BD2Decide presentation template: main slides**



**Figure 5. BD2Decide presentation template: final slide**



## 4 PROJECT SOCIAL NETWORK ACCOUNTS

Social network accounts have been created in order to sustain inbound communication, as defined in D9.2 [4] and D9.3 [5], Section 2.3.

In particular, the following accounts have been created:

- Twitter account at <http://twitter.com/bd2decide> (see Figure 6): it is intended as a “lean” channel, suitable to inform all target groups about what is going on in general in BD2Decide. Published micro-posts will possibly contain a link to more in-depth content, issued on other channels (such as the Project Blog) for interested readers.
- Facebook page at <http://facebook.com/bd2decide> (see Figure 7): given its wide appeal on a large number of users and the possibility to add images and videos that convey more intensive and expressive messages, this channel is mainly intended to reach the General Public as well as Patients Associations and Cancer Research NGOs.

Management credentials for the accounts have been assigned to the following Partners, in order to allow them to conduct related workflow activities, as illustrated in D9.2 [4] and D9.3 [5], Section 2:

- MME, as Work-package Leader of *WP9 Communication & Exploitation* to ensure the overall coordination of the social network communication
- AOP, as Project Coordinator, to supervise the communication messages and guarantee their adherence to the BD2Decide objectives
- ATC, as webmaster of the BD2Decide Website, in order to ensure appropriate technical linkages across social network publishing and web publishing (e.g. automatic Twitter notification of new posts in the Project Blog)

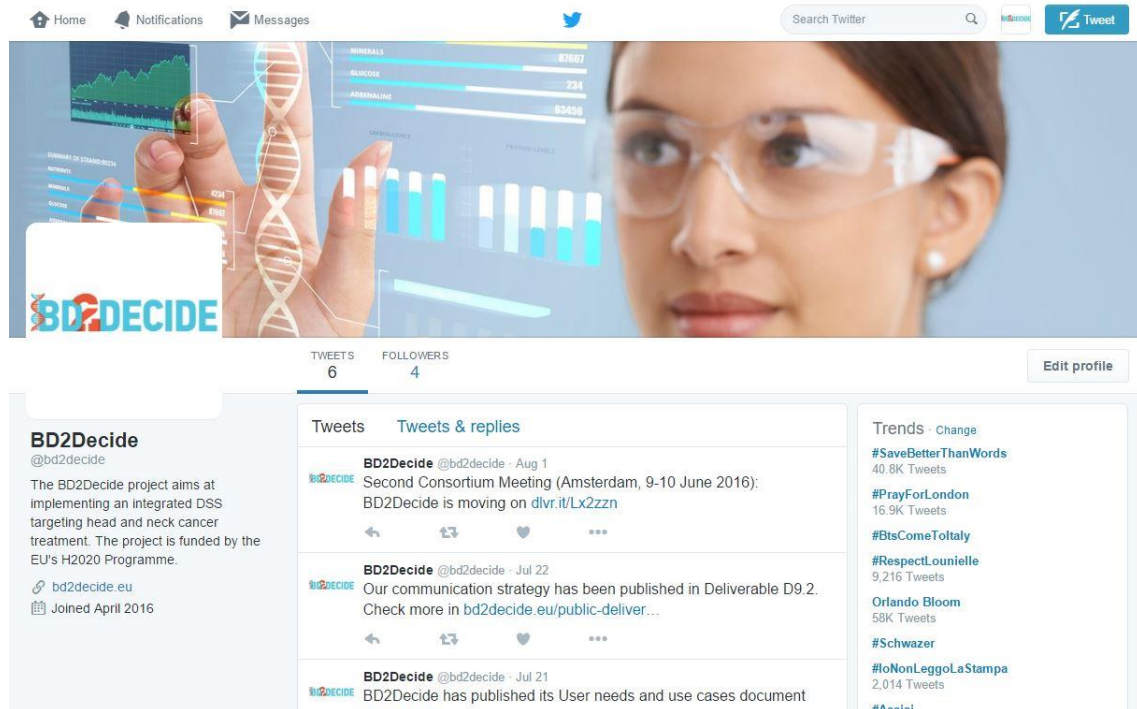


Figure 6. BD2Decide Twitter account (twitter/bd2decide)



Figure 7. BD2Decide Facebook page (facebook.com/bd2decide)





At the moment, no LinkedIn dedicated Group has been created yet. In fact, this is a decision to be made in subsequent releases of this deliverables, as the creation of a specific LinkedIn Group, able to attract wide professional interest, requires the continuous provision of high quality, in-depth content – an activity that may be beyond the main objectives of the Project. Moreover, the opening of a new LinkedIn Group is justified only if the lack of relevant information/discussions from other, already accessible Groups is ascertained.

As mentioned in D9.2 [4] and D9.3 [5], Section 2.3, the current Consortium strategy with LinkedIn is to participate in existing Groups focused on scientific, technical and business areas of interest to the Project.

At the time of writing, the participation of BD2Decide team members has been accepted in the LinkedIn Groups listed in Table 1.

In particular, the table reports:


- Group identification (icon, name and URL)
- Group description (as provided by the Group managers)
- Motivation for participation in the Group, with reference to the three main markets targeted by BD2Decide (as listed in DoA, Part B, Section 2.2.1 Exploitation planning): Clinical Decision Support Systems, Medical Imaging, Big Data Analytics

Group ID	Description	Motivation
 <b>Big Data and Analytics</b> <a href="https://www.linkedin.com/groups/4332669">https://www.linkedin.com/groups/4332669</a>	A network for individuals interested in Big Data with collated industry news and exclusive opinions, features & events.	BD2Decide can attract interest on the usage of Big Data Analytics for cancer treatment.
 <b>Healthcare-IT/ EHR/ HIS</b> <a href="https://www.linkedin.com/groups/37886">https://www.linkedin.com/groups/37886</a>	This group is for people working in Healthcare, Pharma, Lifesciences, Health Insurance, Medical Devices, eHealth, mHealth, EHR, Hospital Info System (HIS), PRM, HC SMAC, HC IoT. Knowledge grows by sharing.	BD2Decide will contribute to the Group its vision on the creation and application of CDSSs for cancer treatment, based on prognostic modelling and data analytics.



Group ID	Description	Motivation
 <p>Data Science in Healthcare</p> <p><a href="https://www.linkedin.com/groups/7010492">https://www.linkedin.com/groups/7010492</a></p>	<p>Data science, machine learning, data mining, information retrieval, natural language processing, predictive modeling, statistics, text mining, image processing, big data, visualization, business analytics, business intelligence – as applied towards the quadruple aim of healthcare.</p> <p>Science, technology and applications are all welcome, including clinical decision support, population health analytics, patient risk prediction, patient safety, precision medicine, personalized medicine, clinical analytics, medical informatics, translational medicine, patient monitoring, epidemiology and biostatistics.</p> <p>Please contribute to an open, vendor neutral and evidence based discussion – so that we can all learn from each other, build stronger relationships and help healthcare improve faster.</p>	<p>This Group is central to the BD2Decide view on HNC treatment.</p> <p>Conversations can touch many Project pillars, such as:</p> <ul style="list-style-type: none"> <li>• Usage of big data analytics in prognostic modelling and HNC decision support</li> <li>• Usage of advanced medical imaging and radiomics in prognostic modelling and HNC CDSSs</li> <li>• Role of data visualisation suites</li> <li>• Role of patient co-decision tools and personalized patient treatment strategies</li> <li>• Etc.</li> </ul>
 <p><b>Population Health Management, Accountable Care Organizations, Healthcare Data Analytics PHM ACO BIG</b></p> <p><a href="https://www.linkedin.com/groups/1802791">https://www.linkedin.com/groups/1802791</a></p>	<p>This group is focused on the next wave of healthcare IT implementations. 73% of all hospitals report population health management as the next big implementation plan. It will discuss PHM issues, Accountable Care Organizations (ACO's) and /or large healthcare systems, and how they feed into PHM. It will address the needs, and requirements of the big data created by EMR's (EHR), and how to deliver smart healthcare data analytics.</p>	<p>BD2Decide will illustrate how the application of CDSSs and big data analytics can impact care management and provide tangible advantages to healthcare authorities and care organizations.</p> <p>The Visualization Suite, including the patient co-decision tool, is also a topic of potential interest for this Group.</p>



Group ID	Description	Motivation
 <b>CT &amp; MRI Medical Imaging</b> <a href="https://www.linkedin.com/groups/142087">https://www.linkedin.com/groups/142087</a>	The CT & MRI Medical Imaging group is one of the largest clinical groups providing peer reviewed / moderated content & contributions. We guard against spam and trolls to provide a CLINICAL focus toward CT, MR, PET/CT, & PET/MR.	BD2Decide conversations in this Group will focus on the application of new imaging techniques and radiomics methods to improve HNC prediction in prognostic models and CDSSs.

**Table 1. LinkedIn Groups in which BD2Decide team members are participating**



## 5 PROJECT LEAFLET

The objective of the Project Leaflet is to support communication through outbound channels, such as press releases, workshops, etc. (see D9.2 [4] and D9.3 [5], Section 2.3)

It contains relevant, general information on the Project and its main objectives, in order to provide a quick and clear overview of the overall BD2Decide endeavor.

Being directed toward most of the actors' categories targeted by the Project (D9.2 [4] and D9.3 [5], Section 1.1), the Project Leaflet tries to strike a balance among the diverse information needs of these actors and acts as a kind of “hub” referring to additional, more specific Project channels.

The main criteria that underpin the leaflet design are the following:

- Build on the Logo look & feel, in order to bring uniformity and increase brand recognition.
- Provide a quick overview of the Project rationale
- Provide a drilldown into the five major Project Objectives (as reported in DoA, Part B, Section 1.1)
- Provide the list of Consortium Partners and as well as a specific contact person (from the Coordinator)
- Clearly indicate additional Project Communication channels, where readers can find more information

The Leaflet is laid out as a classical A4 format, tri-fold business brochure, with a total of 6 pages.

In the cover page, the BD2Decide logo is prominently shown, together with the acronym and the full title of the Action.

In the last page, which is easily accessible even when the Leaflet is folded up, a brief yet clear Project summary is proposed, for readers to get immediately acquainted with what BD2Decide stands for. In this page, information on EU funding – with the claim mandated by DoA (article 27.3) and the EU emblem – is also included in a prominent position.

The list of Consortium Partners is reported in the last external page, in a way that suggests its EU-wide scale. This page also reports the Coordinator's contact point, with his name and email address.

In the three internal pages the five major Project Objectives are illustrated, in the following order:

- O1. Big Data Techniques
- O2. Prognostic Models
- O3. Imaging and Radiomics
- O4. Visualization Suite
- O5. Clinical validation



In the last of these pages, after the description of the objectives, an invitation to visit the Project's online communication channels – namely the Project website, the Project Twitter account and the Project Facebook page – is included.

In order to encourage readers to accept this invitation, the following elements have been added:

- Clear invitation text, proposing to get more information and asking for comments and opinions from readers
- A graphic element, with a representation of one of the BD2Decide social network channels, to attract the eye
- Three QR codes, one on each internal page, directly linking the reader to the Project's online channels (the Project website, the Project Twitter account and the Project Facebook page, as above mentioned)

In the following Figure 8 and Figure 9, the general appearance of the Leaflet is presented.

## THE PARTNERSHIP

BD2Decide is conducted by an international partnership that includes 4 research institutions, 5 cancer clinics and 3 ICT companies.



### Italy

- Azienda Ospedaliero Universitaria di Parma
- MultiMed Engineers srls
- Fondazione IRCCS Istituto Nazionale dei Tumori
- Politecnico di Milano
- Università degli Studi di Parma



### Germany

- Heinrich-Heine-Universität Düsseldorf
- Fraunhofer IGD Visual Computing



### Greece

- Athens Technology Center S.A.



### Israel

- All in Image Ltd



### Netherlands

- Stichting VU University Medical Center
- MAASTRO



### Spain

- Universidad Politécnica de Madrid

## WHAT IS BD2DECIDE?

BD2Decide builds on the joint deployment of (i) data management techniques for “big data” and (ii) an integrated library of analytical models validated by the scientific community, to improve the prognosis and treatment of head and neck cancer.

Cancers of the head and neck region are the 6th more deadly cancers worldwide (in Europe around 150,000 new cases are detected each year) and their treatment can have hard impact on patient's aesthetics and essential functionalities, contributing to a substantial decrease in quality of life.

The intrinsic heterogeneity of such tumours makes their understanding particularly difficult and in most cases the diagnosis is made at later stages, when therapeutic impact is heavier and results are less certain.

The increased availability of new data –both in quality and quantity– is challenging the world of ICT technologies to obtain much more precise prognostic predictions, to implement first-line treatments which maximize therapeutic results and minimize the impacts on the patients' quality of life.

BD2Decide is a cloud based, distributed infrastructure, that will be available to healthcare centres across Europe.



**BIG DATA AND MODELS  
FOR PERSONALIZED  
HEAD AND NECK CANCER  
DECISION SUPPORT**

### CONTACT

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the European Union's Horizon 2020  
research and innovation programme  
under grant agreement No 689715

Figure 8. Project Leaflet: external pages

## BIG DATA TECHNIQUES

BD2Decide deploys Big Data techniques to discover and validate personalized prognostic patterns that outperform current practice. This objective is being achieved through:

- The setup of an appropriate cloud computing infrastructure to collect and homogenize data, in compliance to state-of-art standards.
- The application of data analytics to categorize each individual patient and each cancer sub-type, to find person-specific patterns and to apply the most suited prognostic models.

## IMAGING AND RADIOMICS

BD2Decide refines and validates advanced imaging and radiomics tools, for the discovery of new prognostic signatures. In particular:

- It implements a functional imaging analysis and features extraction tool, that derives new information from images and calculate tumour and lymph-nodes volumes from CT/MRI.
- It implements a radiomics software applied to CT, MRI and DWI MRIs to capture phenotypic heterogeneity in tumours.

## PROGNOSTIC MODELS

BD2Decide enriches and refines existing prognostic models, to obtain an improved and more personalised prediction, through:

- The combination of different models into a single pooled estimate (synthesis analysis)
- The updating of existing models using newly available data sets and adaptive Bayesian machine learning techniques
- The scoring of prognostic factors, to provide physicians with additional insight into the added value brought to the prognosis by each factor.

## VISUALIZATION SUITE

BD2Decide develops a highly interactive visualization and presentation suite for tumour understanding and treatment, based on:

- Digital Patient exploration tools, for easier access to data by clinicians.
- A co-decision environment, to actively engage patients in the therapeutic process, in line with the “no decision about me without me” initiative.
- The development of an assistive data visualization and presentation suite aimed at supporting medical researchers.

## VALIDATION

Clinical validation of the system is conducted in different EU populations, based on around 1000 retrospective cases and 450 prospective cases, collected in the 5 participating clinical centres.

## FOLLOW US

Get more information, provide your comments and opinions, contact us.

Follow us on our online channels:

- Website: [www.bd2decide.eu](http://www.bd2decide.eu)
- Twitter: [twitter.com/bd2decide](https://twitter.com/bd2decide)
- Facebook: [facebook.com/bd2decide](https://facebook.com/bd2decide)

Figure 9. Project Leaflet: internal pages



## 6 PROJECT NEWSLETTER FORMAT AND EDITORIAL PLAN

The Project newsletter represents one of the most important outbound channels for BD2Decide. The newsletter is well suited for sending through mailing lists managed by each Consortium Partner, or to other 1-to-many channels accessible to the Consortium.

In a sense, it is the main institutional herald for announcing Project advancements.

As such, the newsletter must satisfy several requirements:

- It should be issued when major steps forward have been accomplished by the Project, in order to provide an authoritative voice on what has been achieved, what are the impacts of those achievements and what will be the next moves. Ideally, a newsletter issue should be published at each Project milestone (see milestone list in DoA, Part A, Section 1.3.4). However, availability of sufficient material to capture the interest of addressed target actors, is also a prerequisite
- It should strive to address multiple categories of targeted actors – although the focus is mainly on professionals and policy makers that need reference material, not only to be briefed on the Project but also, in turn, to brief others players that could be involved in potential deployment and exploitation endeavors
- It should be, at the same time, rigorous and “to the point” but also concise and efficient to read

In order to address these requirements, the following general structure is proposed for each newsletter issue:

- **Editorial Leader:** to sum up the work done by the project since the previous newsletter issue; it should focus on measurable results obtained, advantages brought to the addressed user categories and a brief indication of plans for advancing the work. The editorial leader should be written by the Project Coordinator, possibly with the support of the Leader of *WP9 Communication & Exploitation*
- One or more **articles on specific, technical results achieved in the period.** These articles can focus on technical aspects of the results and should highlight in particular what are the innovations contributed by the Project, given the current state of the art. These articles should be written by technical Partners, leading the implementation work for the relevant technical components
- One or more **articles on usage scenarios**, either real ones – as experimented in the Project validation activities – or hypothetical ones, as they will be proposed to potential users and customer during the Project exploitation phase. These articles should be written by clinical Partners and should focus on the impact of BD2Decide in the clinical settings, discussing when possible the achievement of the Key Performance Indicators mentioned in the DoA, Part B, Section 2.1 (Expected Impacts).
- One or more **small snippets on liaison actions or events** conducted by the BD2Decide Consortium or by individual Partners toward specific actors categories (e.g. presentation to



conferences or in scientific journals, organization of workshops, participation to relevant trade fairs, etc.)

- Clearly mentioned **contact coordinates**, for readers that would like to obtain more information or get in touch with the Consortium

Figure 10 and Figure 11 show the proposed graphical representation for the above structure, which is based on the Project Logo and its graphical style, as presented in Section 2 above.

The Figures illustrate the format for the first page (which includes the Editorial Leader) and last page (which includes the invitation to contact the Consortium). In addition, newsletter issues may have any extra number of middle pages, containing more articles and more snippets on liaison actions or events.



## NEWSLETTER 01

Big Data and Models for Personalized  
Head and Neck Cancer Decision Support

30 November 2016

Page 1 / 2

## Article Title

## Subtitle

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## Article Title

## Article subtitle

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## Editorial Leader

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[www.bd2decide.eu](http://www.bd2decide.eu)
[twitter.com/bd2decide](https://twitter.com/bd2decide)
[facebook.com/bd2decide](https://facebook.com/bd2decide)


This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689715

Figure 10. BD2Decide Newsletter format, first page



## NEWSLETTER 01

Big Data and Models for Personalized  
Head and Neck Cancer Decision Support

30 November 2016

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Figure 11. BD2Decide Newsletter format, last page



Based on this structure, the editorial plan for the BD2Decide newsletter is presented in Table 2.

In particular, for each proposed issue, the table presents:

- Dates for preparation (planning)
- Date of delivery
- Overall message (which will form the basis for the editorial leader)
- Aspects that could be addressed in the technical articles and usage scenario articles

With respect to the planning reported in the previous release (D9.5 Deliverable D9.5 Dissemination materials – first release, August 31<sup>st</sup> 2016, The BD2Decide Consortium), the following changes have been implemented:

- Combine the first and second issues, planned for MS2 and MS3 into one single issue to be delivered after MS3, in order to wait for more information on actual implementation of Project modules, in particular for deliverable D5.4 (*The IPDA prototype*), released at M18.
- Start issues' planning at the relevant Milestone (instead of two months in advance), in order to wait for relevant results due at the Milestone itself and make better editorial decisions, based on the actual advancements of the Project and available material, and release the newsletter issue after two months from this date

Planning date	Delivery date (Milestone)	Overall message	Technical/applicative aspects
M18 (MS3)	M20	<p>BD2Decide's clinical, functional and technical framework are in place. This gives to interested readers an understanding of what the Project is set to achieve, during the next two years.</p> <p>Moreover, the Project has also produced its first prototypes (in particular, the IPDA prototype, D5.4), that provide insights into the technical and clinical challenges that are being tackled.</p>	<p>Illustrate specifications.</p> <p>Illustrate usage scenarios</p> <p>Illustrate existing prototypes.</p> <p>Describe how the prototypes can be used in the clinical practice, and with what impact.</p>



Planning date	Delivery date (Milestone)	Overall message	Technical/applicative aspects
M25 (MS4)	M27	The Project has assessed and described its market requirements: the reader can learn which actors will be targeted, and how their needs are actually addressed by BD2Decide.	Discuss several clinical applications of the BD2Decide platform, based on the identified market requirements.  Address how BD2Decide technical components can be proposed to different user communities (bundling, business modeling, etc.).
M36 (MS5)	M38	The first complete version of the BD2Decide platform has been released.	Describe one or two usage scenarios that completely cover all BD2Decide functionalities.  Describe how the BD2Decide technical platform can be configured and deployed at users premises and/or in the cloud.
M41 (MS6)	M43	The final version of the BD2Decide platform has been released: interested readers can start contacting the Consortium to obtain access to it.	Same as the previous issues, but with a stronger emphasis on the possibility to tailor usage and deployment scenarios to the specific needs of potential users/customers.
M45 (MS7)	M47	Final issue: farewell and invitation to contact the Consortium to procure the BD2Decide platform.  To be delivered after the end of the Project, together with the final report.	Same as previous issue, but focusing more on applicative issues (e.g. regulatory issues, from the clinical point of view, hosting and performance issues from the technical point of view, etc.)

**Table 2. Newsletter editorial plan**



## 7 PROJECT VIDEO PRESENTATION

The BD2Decide Consortium intends to prepare a video presentation of the Project, that should be used to give an immediate and “time efficient” overview of the objectives, the challenges that need to be faced and the expected results/impacts.

An important decision to be made is when to create the video, balancing two competing needs:

1. The need to have the video available as soon as possible, in order to reinforce the Project communication actions on online channels
2. The need to have enough Project results available, in order to be able to represent at best the challenges which are being faced

The Consortium has revised the editorial planning, and proposes the following steps:

- Wait for milestone MS4 (M25, *Market requirements assessed and first BD2Decide prototype*, on M25) to design the detailed content of the first version of the video, in order to more precisely take into account the market and exploitation needs of the Project and consequently target the video content. This also allows the Consortium to include content that effectively illustrates specific solutions that have been chosen, from both a medical and engineering point of view, as represented in the first prototype.
- Wait for milestone MS5 (M36, *BD2Decide platform release*) in order to create an additional video segment – to be inserted into the first version – which, in addition to what already presented, also demonstrates the functioning of the first BD2Decide platform release, so as to better characterize the expected configuration and impact of the Project

In Table 3 the overall structure proposed for the video is presented.

The structure is formulated in order to illustrate all important aspects of the Project, while at the same time keep the duration under the 2:30 minutes mark, which is considered as the maximum attention span that can be required from viewers for this kind of presentation.

Release	Section	Duration	Content
1.0	Project logo, acronym and title	5 s	Brand presentation
1.0	Illustration of the needs	20 s	Explain what are the HNC clinical needs that drive the BD2Decide endeavor (e.g. reduce costs, improve prognosis, treatment, improve QoL, etc.)



Release	Section	Duration	Content
1.0	Project objectives	25 s	Illustrate the specific BD2Decide objectives, in particular: deployment of big data, prognostic modelling, usage of imaging/radiomics techniques, visualization suite and patient co-decision tool, clinical validation.
1.0	Methodology	30 s	Illustrate the clinical and technical methodologies that the project is applying in order to achieve its objectives (e.g. illustration of major components, as described in specification deliverables).
1.0	Expected impacts	20 s	Illustrate how the implementation of the BD2Decide will impact the treatment of HNC, from the points of view of: <ul style="list-style-type: none"><li>• Clinicians</li><li>• Healthcare managers</li><li>• Patients</li></ul>
2.0 (additional part to be inserted at this point)	Prototypes	30 s	Illustration of prototypes and demonstration of how they help to achieve the expected impacts
1.0	Contact info	10 s	Logos or names of Partners and contact information.
1.0	Acknowledgment of H2020 funding	10 s	EU emblem and mention “This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 689715”

**Table 3. BD2Decide video structure**

ANNEX: NEWSLETTER, 1<sup>ST</sup> ISSUE

## NEWSLETTER 01

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## Usage scenarios

### Who will benefit from BD2Decide, and how

BD2Decide aims at realizing and validating an *Integrated Decision Support System*, providing clinicians with all the necessary tools and information to personalize treatment and care delivery to each and every HNC patient, in contrast to the current “one-size-fits-all approach”.

Several usage scenarios, presented below, may help to capture the actual benefits entailed by the Project, in addressing the needs of involved actors.

**Use case 1: diagnosis.** A patient is visually inspected and all relevant clinical, socio-demographic, and behavioral information are collected and systematically input to BD2Decide. Visible suspect areas

are biopsied for histological examination. When a swelling of the neck is detected, cytological aspiration under ultrasound guidance will be performed by the radiologist. Imaging by CT or MRI will be acquired on indication. The imaging data are processed by the BD2Decide Image Analysis tools, for extracting *radiomics* features that enrich the diagnostic dataset. In this case, a suspect lesion on the left side of the tongue is seen and, therefore, biopsied by the surgeon. BD2Decide, collects all these clinical and radiological information and run prognostic models on it. This gives to the clinician a feedback regarding patient's prognosis and QoL, based on stage and standard treatment, and allow her to compare the different treatment options.

**Use case 2: treatment decision making.** Clinicians need to discuss

## Big data for HNC

BD2Decide aims at providing solutions to a challenging clinical problem: personalizing treatment decisions for late stage head and neck cancer (HNC).

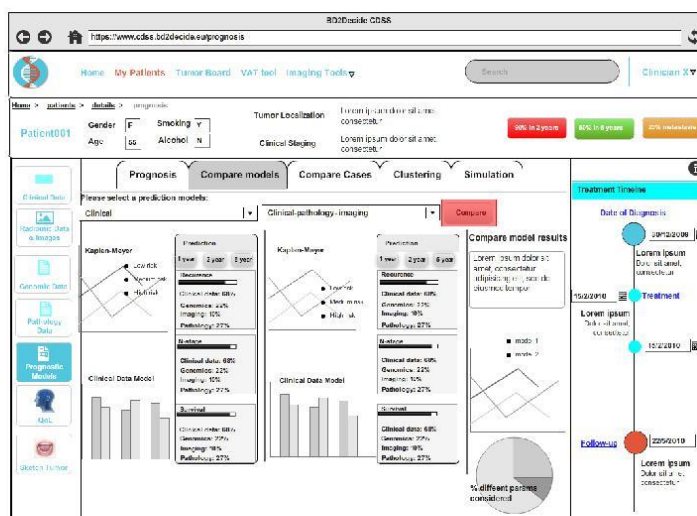
The strategy of the Project is to achieve such objective through the application of a “big data analytics” approach, that harnesses a large and diverse number of data sources, including population-specific epidemiology, behavioral and environmental data and patient-specific multiscale data from genomics, pathology, clinical and imaging repositories.

The system will integrate a number of software applications, to be used in daily clinical practice, from the first visit, to the evaluation of disease evolution, the determination of the most effective therapeutic approach, throughout all the care path, up to the last follow-up visit.

After 18 months of work, the overall analysis of requirements and system specifications have been completed, giving a well-defined picture of what is envisaged and what will be provided to clinicians, patients and researchers.

This Newsletter provides some glimpses into that picture, building on information available from our public deliverables.

The interested reader is invited contact us with no hesitation, at the coordinates given overleaf, in order to obtain more information



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a specific case in a *Tumor Board session*. The Tumor Board consists of head and neck surgeons, oral and maxillofacial surgeons, head and neck radiologists, radiation oncologists, medical oncologists, pathologist, oncology nurses, and residents in training. The Tumor Board chair defines the date of a *virtual Tumor Board meeting*, supported by BD2Decide through videoconference. The system proposes an electronic agenda to define date, time, location and participants. Participants receive an automatic invitation. During the videoconference, all Tumor Board members access the patient's data (including imaging) and may run several BD2Decide prognostic models on it, as necessary to discuss the case. The results of the Tumor Board session (treatment decisions) are automatically recorded and digitally signed by the participants.

**Use case 3: follow-up.** After therapy, BD2Decide supports the definition of a schedule for follow up care and generates a plan that can be printed out, for clinicians as well as for the patient. This plan integrates clinical investigations as well as laboratory and imaging investigations. The plan is changeable: suppose that a lymph node metastasis has appeared in 8 weeks despite a low reoccurrence prediction by BD2Decide models. The software automatically "reacts" and intensifies the follow up schedule, suggesting new relevant imaging exams. Based on the new data, the clinician runs

## Head and Neck Cancer: a brief intro

According to GLOBOCAN 2012 (<http://globocan.iarc.fr>), cancers of the head and neck region (*Head and neck cancer* – HNC) are the 6th most deadly tumors worldwide, with around 630.000 newly detected cases (of which 150.000 in Europe) and around 350.000 deaths every year (of which 70,000 in Europe).

HNC develops in the mucosal linings of the upper aero-digestive tract (oral cavity, larynx, oropharynx, hypopharynx). Over 90% are squamous cell carcinomas (*Head and neck squamous cell carcinoma* – HNSCC), arising from the epithelial cells on the mucosal surfaces of the head and neck. HNCs are classically divided, according to their site of origin, in oral, oropharyngeal and laryngeal tumors, that differ widely considering risk factors and biological behavior, hampering the development of general prognostic models.

Risk factors for HNC are smoking and excessive alcohol consumption, and more recently infection with the human papillomavirus (HPV).

again the BD2Decide prognostic models and verifies how the prediction is changed.

## Architecture

### How the system is built

BD2Decide builds on emerging technologies for big data analysis and virtual representation of patients health data, that facilitate collaborative, objective, best informed and personalized decision-making.

The overall system architecture is composed of three layers: a *User Interfaces* layer, a *Models and Service* layer and a *Data* layer.

The **User Interfaces layer** enables end-user interactions with the BD2Decide system. It includes the following modules:

- A *Clinical Decision Support System*, comprising the Patient

Documentation System and the Digital Patient Exploration Environment, that allow to access and interpret all patients' data in a comprehensive and consistent way. It also includes the Tumor Board Collaboration Environment, supporting the Tumor Board's multi-disciplinary decision making process, through remote interaction

- An *Imaging Visualization and Analysis Tool*, for image segmentation and radiomic features extraction
- A *Visual Analytic Tool*, that assists the work of clinical researchers, active in HNC investigation, through query and aggregation of data, identification of trends, patients' clusters, etc.
- An *Interactive Patient's co-Decision Aid*, that presents



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patient's treatment alternatives, as identified by the physician, along with estimates of curative effectiveness and impacts/side effects, in order to support clinicians and patients in their co-decision process

module includes functions for uncovering hidden patterns, unknown correlations, medical treatments trends, clinical preferences and other useful information to support clinical decisions.

The **Models and Service Layer** gathers together the models to be used for data analysis, such as:

- a library of statistical prognostic models
- the module for image enhancement (segmentation and radiomics feature extraction)
- the module to support genomic analysis and identify genomic signatures
- the knowledge management system
- the big data analytics module

In particular, the big data analytics

The **Data Layer** is composed of three databases groups:

- **Local Storage Units**, that represent storage placed at each clinical center instance. This contains data that is not shared across the system's modules and is only accessed internally from each center. The local storage used by the imaging processing and genomic processing tools installed locally
- **Big Data Storage**, that contains the large and varied datasets necessary for the discovery and

validation of personalized prognostic patterns. Examples are: data related to statistical prognostic modelling, anonymized clinical data collected from patients EHRs, genomic signatures, segmented images and results of radiomics features extraction

- **External Data Sources**, that represent repositories on useful population data or scientific information, such as cancer registries, environmental or epidemiology repositories, and literature databases

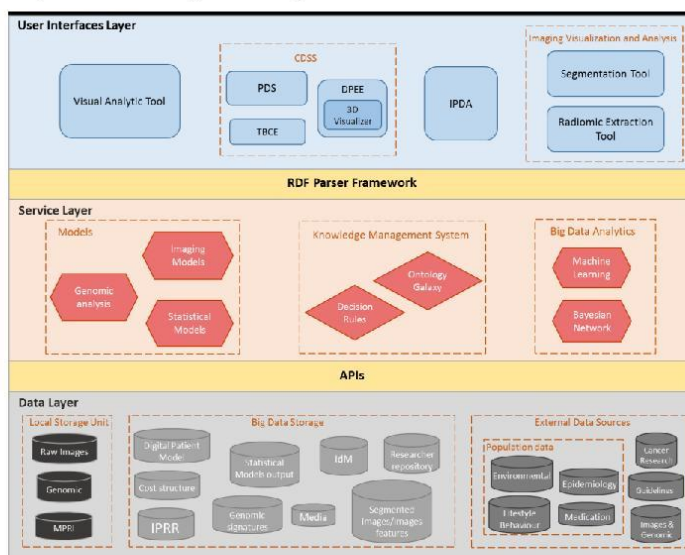
## Population data

*A glimpse into a class of BD2Decide data*

One of the pillars of the BD2Decide approach to big data analytics is the inclusion of population-related epidemiology and risk factors data, that will be used in order to complement patients' longitudinal data collected from retrospective and prospective cohorts, with a wider picture of HNC epidemiology information in European populations.

Population data in BD2Decide will be collected at different levels:

- Aggregated population data i.e. data not directly linked to individuals but linked to clusters of populations (e.g. by territory, gender, localization of disease, census etc.)
- High-resolution population data i.e. data linked to specific individuals. A small cohort of patients enrolled for



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BD2Decide (who have provided consent) will be selected to collect several of their health data from territorial health agencies (e.g. medications, visits to specialized physicians, comorbidities, visits to GPs) when available. This high-resolution data will allow to investigate how additional patient's data, not normally collected during HNC treatment, may increase population and patient's profiling and improve the accuracy of prognostic models

- Cancer Registries data, collected in collaboration with the RARECAREnet EU project. Data at individual level will be extracted from two different database: (a) the database of a pilot study on centers of treatment for rare cancers: (b) the database of a high-resolution study on head and neck cancers

- External data from other sources relevant to BD2Decide. This includes, for example, data from the International Agency for Research on Cancer (IARC) repositories, data from the World Health Organization (WHO) repositories, EURO-STAT aggregated data on health determinants that might be of use to correlate populations lifestyle behaviors with disease prognosis, etc.

### Interactive Patient co-Decision Aids

#### *The patient is involved in the decision process*

Treatment decision for cancer patients brings out a number of ethical aspects concerning patients' acceptance, compliance and full understanding of treatment pros, cons and consequences. These issues are addressed through a "participative medicine" approach, which involves patients and

clinicians in a process of understanding (Q&A, what if) and clarifications (scientific background, explanation of the patient's treatment options).

The BD2Decide Interactive Patient co-Decision Aids (IPDA) supports this participative decision-making process for HNC, through interviews with reference clinicians, animations explaining the disease and the different treatment options, individual verification of treatment options vs. patients' preferences – in terms of efforts required, quality of life and expected treatment outcomes derived from scientific evidence. In this way, patients can either independently or in presence of their caregivers, formulate their own opinions and achieve a better shared treatment decision with her doctors. The IPDA tool can be used as stand-alone tool or linked to the patient's data and prognostic models.

### BD2Decide in the scientific community

BD2Decide has started disseminating its initial findings within the scientific community, through papers that have been accepted for publication at international journals and conferences, such as:

- Journal for Oto-Rhino-Laryngology and its Related Specialties
- Oncotarget
- Current Treatment Options in Oncology
- 39th Annual International Conference of the IEEE Engineering in Medicine and Biology Society

For a full list of BD2Decide publications, consult the Project website at the URL <http://www.bd2decide.eu/publications>

#### You are welcome to contact us:

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