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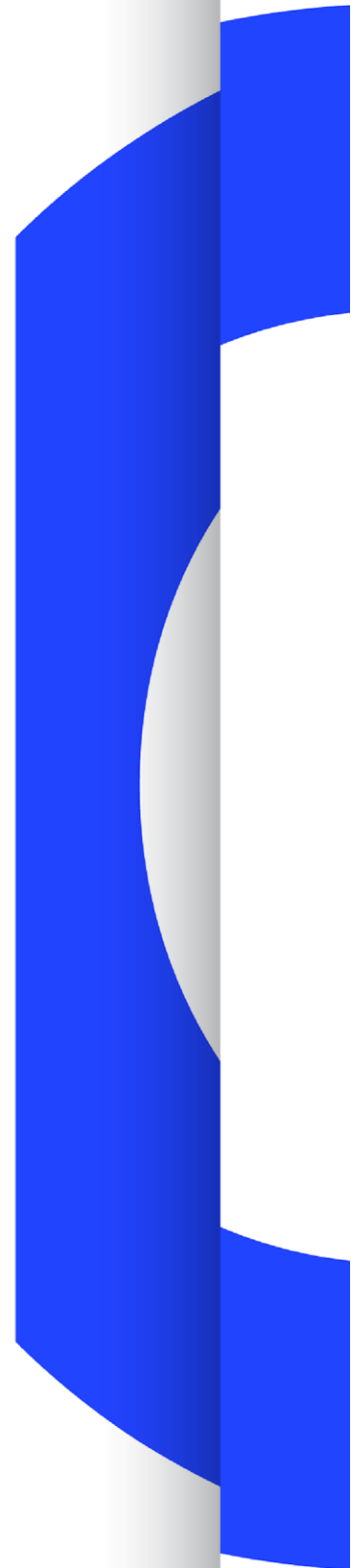
TR 041

MODELLING CORE BUSINESS OBJECTS AND PROCESSES IN DIGITAL MEDIA ENTERPRISES

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Executive Summary

This report presents a model of the core business objects and the cycle of business processes in digital media enterprises.

The model is a value chain model. The scope of the model is end to end, representing all value adding activities by media enterprises and their consumers. The model is generic and simple. It is applicable to any type of media, any type of content, any method of production, any platform of distribution, any way of consumption, etc.

The model has been designed to tie the processes to the objects that carry business value. In fact, the idea of adding value has been the main criteria for structuring the core processes presented in this model. This focus on business value makes it a core model for all business domains in the media industry, not only for the technical domain.

Consequently, the model can be used in a wide variety of ‘problem’ domains. It provides a common understanding and a common wording, which is essential to support better communication for people from very different areas of expertise and different business units.

The model supports the analysis, description and comparison of many aspects of business development: it serves in strategic, financial, organizational, legal and technical planning as, for example:

- in radio, television and multimedia use cases
- for linear and on-demand consumption
- on news, fiction, sports, documentaries, commercials, teasers, previews, user generated content
- for studio and outside production
- for the purchase of films, retrieval from archives, signal acquisition via networks
- for distribution via broadcast and broadband platforms
- for regulatory issues between producers, broadcasters and distributors
- for classical and targeted advertising and promotion
- for programme guides and recommendation systems
- for personalization in respect of privacy regulation and best practices
- for consumption on fixed and mobile devices
- for user consumption analysis such as zapping, commenting, liking, voting, posting, churning, etc.

Section 1 introduces the need, the intention and the benefits of the model. Sections 2 to 5 present the notation and the model itself. Finally, the Annexes give more details on the development of the model and several use cases for its utilization.

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Modelling Core Business Objects and Processes in Digital Media Enterprises

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1. Introduction

The media industry is experiencing a profound transformation. Digitization has a strong impact on traditional ways of doing business and, at the same time, enables new opportunities: new services are provided through new ways of consumption; new technologies are used in production as well as new platforms for distribution; new types of content are being delivered; new feedback loops are being proposed for consumers; new revenue streams are possible as well as new roles and new players in the market. But still, the traditional ways of doing media business are alive and will maintain a substantial share of the market. The duality of tradition and innovation will prevail.

In this dual context, media enterprises must re-evaluate their strategies. As a prerequisite for discussing new strategies, the domain of operations and associated potential problems must be understood with impeccable clarity. But how can we achieve this goal? The first step is to focus on core businesses and eliminate secondary, less critical issues. Second, the terms in which a problem is described must be commonly understood.

These two features, clarity and terminology, are what a good model can deliver. Such models cover the problem and associated domain seamlessly, i.e. traditional and new aspects alike. In that way, they provide the necessary orientation for defining a successful strategy.

The «Core Business Objects and Processes Model» is designed for this purpose. As a value chain¹ model for digital media enterprises, it defines the input and output objects of the transformation processes in a generic way, so it can cover both the traditional and future ways of doing media business. The process model is an end to end model that spans over all activities by the provider as well as by the consumer to form a full cycle.

Besides the strategy definition, there are many other situations in which the model could be applied: organizing process management, designing information architecture, evaluating business architecture, etc.

Of course, these tasks were always there in the media industry. And obviously, they were solved in all the enterprises that survived until today. So why do we need a new model? What was lacking

¹ see https://en.wikipedia.org/wiki/Value_chain

in the current models? What is new is that the model presented in this report spans over enterprise *and* consumer activities and at the same time covers *all types* of related business objects. It is a truly generic model of the media industry's value chain.

The model has evolved from discussions about the Class Conceptual Data Model: CCDM² needed more classes to represent business objects also from the planning, consumption or analysis domain. An end-to-end model of business processes and business objects was considered helpful to identify those classes. The evolving model provided common wording and structure. It allowed comparing use cases and thus sped up discussions. The model itself was also hardened in those discussions. It ended up in a separate discussion thread, which finally lead to this report.

The structure of this document is as follows: Section 2 describes the graphical elements used in value chain modelling. Section 3 introduces a top-level model, which is refined in section 4. From there the core model is derived in section 5. In Annex A the refinement and extension steps are explained. Annex B gives an easy to read, continuous description of the end to end process. Finally, the core model is applied to use case examples in Annex C.

2. Modelling a Value Chain

In a value chain model the term 'value' is used in the sense of 'value for the consumer' or 'value for the provider' of media services. The value is associated with **Business Objects**. **Processes** transform **Input Business Objects** into **Output Business Objects** with added value. This will be represented as in Figure 1.



Figure 1: Value adding Process

Processes consist of a sequence of activities, optionally interconnected through conditions³. However, these details are not represented in the model. In the context of this document processes are regarded as "black boxes".

Enablers are optional (Figure 2) and represent tools to execute the activities in a **Process**. Although they usually have an intrinsic economic value, they are not **Business Objects**, because **Processes** do not increase their value. Depicting an **Enabler** is recommended, when there is a need to clarify the role of a (technical) system.

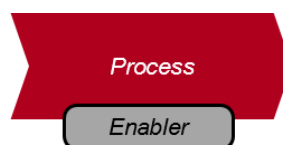


Figure 2: Optional Enabler supports Process

As the value chain aligns **Processes**, these are interconnected by **Business Objects**. **Business Objects** are the output of a preceding **Process** and the input of a following **Process**. At any one interconnection point, **Business Objects** can be single or a multitude of the same type or even of different types. Processes may occur in parallel if they can be synchronized with the whole value chain through their Input and **Output Business Objects** (Figure 3).

² see EBU Tech 3351: Class Conceptual Data Model

³ see https://en.wikipedia.org/wiki/Business_Process_Model_and_Notation



Figure 3: Business Objects interconnect Processes in a value chain

2.1 Refinement Strategy

For an end to end value chain model one may start with a one-link chain model. The link may then be cut and the two ends can be interconnected by a **Business Object**. From the top level the desired level of granularity can be reached by repeating to cut **Processes** (Figure 4). Cutting is needed until the pending questions can be addressed with appropriate terms.

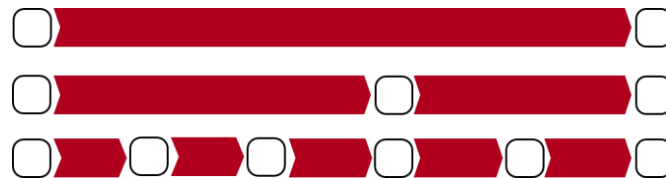


Figure 4: Refinement levels of a value chain

The difficult part is to identify the appropriate places where to split a **Process**. Two conditions must be met for this: the interconnecting **Business Object** must have a generically defined value (in the sense defined earlier) and both the preceding and the following **Process** must add value.

2.2 Cyclic Processes

A Process can be of cyclic nature if its input object and output object are of the same type. However, the objects are not identical. Therefore, the circle can always be represented by a linear graph as shown in Figure 5.

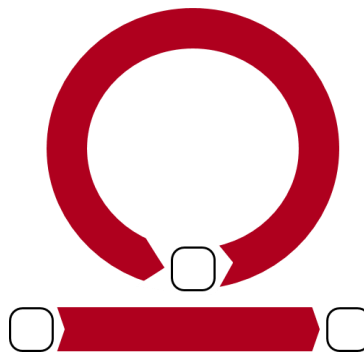


Figure 5: A value chain of cyclic nature

3. Modelling the Top Level

The process model claims to be an end to end model. The entire value chain is shown in two steps. The first input object and the last output object are of the same type, which emphasizes the process' cyclic nature: First, **Demands** are transformed into **Consumption Events**, second, those events are transformed into new **Demands** from which a new cycle may start. This is referred to as the Top Level (Figure 6).



Figure 6: Top Level Model

Demand represents all external requirements: consumer needs, business requirements, legal requirements etc. Examples of real **Demands** may be: an unexpected high (or low) clicking rate on

a newly launched web series expressing the users’ desires (or their indifference) for more episodes, a law that defines the mandate for a public service broadcaster (that, of course, is stable and does not change with single Consumption Events) or a financial target revenue for a specific media service.

The **Consumption Event** is the result of the **Digital Media Service Provisioning** process. It represents the consumption of any service provided by the media enterprise for a consumer. Examples of **Consumption Events** are: reading a news article from a website in your browser, watching a movie in HD on your TV set from a linear service, doing the same on a tablet from an on-demand service or watching a second screen offer accompanying a live sports programme.

User Experience & Analysis sums all activities of the user associated with the consumption of media services (e.g. viewing times, clicks, likes, shares, churns, interviews, comments) and the processing and interpretation of the data resulting from these activities. This process leads to new **Demands**.

4. Refining the Model

Figure 7 represents the refined business process model for digital media. Every process, business object and enabler is defined and explained with examples.

The refinement steps are explained in annex A. Refinement was conducted only so far, that the resulting model is still valid for every possible **Business Process**, **Object** or **Enabler** in digital media.

First time readers might prefer to read the more detailed description given in Annex B before continuing.



Figure 7: Refined Model

4.1 Notation used in Description

[Elementtype]: [Element Name]

[Definition]

- [Examples]

4.2 Description

Business Object: Demand

The total of all external requirements, for example:

- an event with relevance to consumers like the Olympic Games or an earthquake
- an unexpected high (or low) clicking rate on a newly launched Web Series expressing the desire (or the indifference) for more episodes
- a law that defines the mandate for a public service broadcaster (that, of course, is stable and does not change with single consumptions of a media service)
- a financial target revenue for a specific media service

Process: **Publication Planning**

All activities to create a **Publication Plan** on what to publish, how, when, where and for whom based on **Demand**.

- creating a strategic plan on structured slots for different genres and audiences
- inserting programmes or commercials in a traffic management system
- planning an advertising/promotional campaign

Business Object: **Publication Plan**

A plan in space and time for publishing **Products**.

- a plan of the slots and programmes in the upcoming year
- a precise and detailed plan on programmes, ads, trailers, etc. for the next day
- a plan for the pages/columns/frames/etc. and the web articles to be published on a website

Process: **Commissioning**

All activities to create an **Order** for producing, purchasing, retrieving a **Product** and clarifying its **Rights** or for selling advertisement space, time, views, visits, clicks, etc.

- dealing on the purchase of a series from a movie producer
- deciding on conceptual responsibility and financial support to produce a new TV show concept and clarifying the required rights
- discussing the pros and cons of accompanying a live sports event with Twitter activities
- creating a list of available slots and spaces (e.g., banners) for advertising for the target audience of a TV channel
- dealing on new sales rates with a consumer electronics store
- offering advertising space in a music app for young people

Business Object: **Order**

A directive for purchase, reuse or production activities; A directive to take in advertisements resulting from a contract on advertising.

- purchase order for a series; production order for a documentary
- production order for a live ticker on a live sports event
- intake order due to sales agreement for advertisements of a car vendor

Business Object: **Right**

A permission to use a work with respect to intellectual property laws, a contract or a licence with applicable obligations and prohibitions.

- the set of rights to publish audio and video from the host broadcaster on a sports event over the web
- the right to publish a movie 3 times in a country
- the right to reuse material with children for editing new items
- the right to use music for a TV drama production, but only in non-violent scenes

Process: Production

All activities that generate, transform, edit, aggregate, etc. audio, video, text or data to create a Product.

- downloading a movie package from a media house, checking it, transcoding it
- producing an outside video for a news magazine
- executing post-production on a self-produced episode of a series
- creating a post in a social network
- creating a movie trailer through AI technology

Business Object: Product

An editorially, technically and legally approved piece of media content, ready to be published.

- the signal of a live sports event programme as finalized by its producer
- a completed and publishable episode of a series
- a journalist's post on a social network
- a commercial spot before airing

Process: Publication

All activities to aggregate Products and to adapt the result to a Distribution Platform.

- putting broadcast-ready TV programmes in a schedule, stream them to the play-out centre and adapt them to a satellite distributor's format
- Hitting the "post now" key on picture with text from a social network account
- posting a new article on the web portal

Business Object: Media Service

A compilation of Products technically adapted to the Distribution Platform, forming the offer of a media enterprise

- the signal of a linear TV service (e.g. TF1, SRF2, TV2) prepared for satellite distribution; the same for cable distribution; the same for web distribution;
- a list of messages for a live ticker on a broadcaster's website
- an API providing data for an EPG app

Process: Distribution

All activities to provide service access points to the consumer.

- sending a satellite signal to earth and receive the signal with a dish and a satellite receiver (the access point is the receivers video output)
- sending a requested VoD stream through a CDN to consumers' internet access points
- sending requested data for a second screen app to the consumer

Enabler: Platform

A technical facility for the transport of Products from the provider to the consumer or for the exchange of Products and Resonance Events between all platform participants.

- Eutelsat (e.g. for programmes in a linear TV service)
- DVB-T (e.g. for programmes in a linear TV service)
- Internet, supported by CDN (e.g. for programmes in a VoD service)
- WWW (e.g. for web articles in a broadcaster web portal service)
- social networks (e.g. for text, picture or video posts and for comments, likes, dislikes, shares in an account or under a hashtag).

Business Object: Bundle

A set of **Media Services** accessible by the consumer in a common technical mode.

- the output signal of a satellite receiver
- the DVB-T signal at the output of the receiving antenna
- the output of a home internet router

Process: User Access

All activities to select a **Product** from a **Media Service**, a **Media Service** from a **Bundle** and to consume the **Product** in a **Consumption Event**.

- switching on a FM receiver, tuning a station, turning up volume;
- Logging in to your preferred social network account, choosing a friend's timeline and reading his posts
- visiting a news website
- starting your favourite broadcaster's app.

Enabler: Device

A technical facility supporting access, licence checking and presentation activities.

- HDTV set
- HDTV set with SmartCard module
- browser/website
- app with DRM module
- social network client
- FM radio.

Business Object: Consumption Event:

The event of using **Media Services** and the **Products** within.

- watching a live sports event on an HDTV; the same on an SDTV; the same on a tablet;
- reading a live ticker for that event on a mobile
- listening to a live radio programme for the event on FM; the same on DAB;
- checking out statistics for that event in an app; the same on a website;
- reading tweets under a hashtag associated to an event on a Twitter client

Process: User Experience

All measurable activities by the consumer related to the consumption of the **Media Service**.

- viewing a TV programme until the end
- switching to another TV channel
- liking a post
- starting a video on a social network
- liking this video
- commenting a news article on a web site

Business Object: Resonance Event

All perceivable reactions of consumers related to using a **Media Service**.

- viewing time
- a comment/like/dislike
- a download
- a post
- a new follower.

Process: Analysis

All activities associated with aggregating, processing and interpreting the **Resonance Events** in order to express the **Demand**.

- calculating the average viewing time
- calculating the overall churn rate of an app
- comparing rates to concurrent media service resonance
- interpreting the data to adapt strategic requirements, e.g. move sports programme from Wednesday to Thursday, continue series with another season.

5. Completing the Core Model

The refined model is not yet complete. It does not cover archive related processes and consumer licensing. These processes are not in the refined model, because they cannot be derived from existing processes by simple refinement. Instead, they need to be defined by extending the model. This extension is appropriate for processes with input or output being connected to more than one business object or running in parallel to two or more other processes.

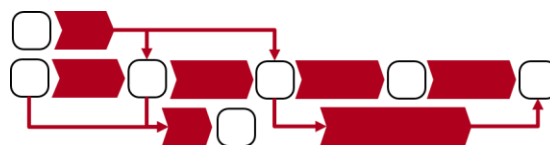


Figure 8: Extension Options in a Model

In Figure 8, the lines connect alternative input or output objects, respectively. Parallelism of processes is only limited by their interconnecting business objects. In graphical terms: parallel processes may be moved horizontally in the space between their input and output business objects.

To complete the model to the core model, the three processes **Preservation**, **Retrieval** and

Consumer Licensing are added as extensions as shown in Figure 9.

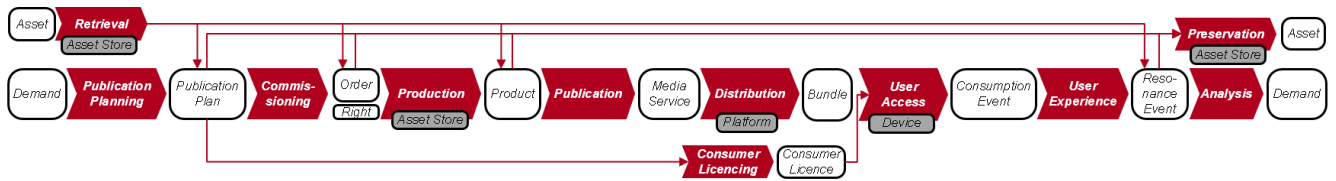


Figure 9: Core Model

For **Retrieval** and **Preservation**, the most frequent case is a **Product** being the output of **Retrieval** or the input of **Preservation**. The other lines represent alternative interconnections, like the **Retrieval** or **Preservation** of **Resonance Events**.

It is important to note that **Preservation** may take any available maturity stage of the **Business Objects** as input, for instance, raw film footage, and **Retrieval** will result in exactly the maturity stage at **Preservation**'s input. The goal is to preserve/retrieve the value. In that sense, there are many more interconnecting lines from objects within the processes that are not depicted here.

Additionally, **Retrieval** and **Publication Planning** may or may not be executed in parallel. The same applies for **Preservation** and **Analysis**.

Finally, the **Consumer Licensing** process and the **Licence** object are added. **Consumer Licensing** has the **Publication Plan** as input and the **Consumer Licence** as output. The **Consumer Licence** is then an additional input for the **User Access** process.

5.1 Description (continued)

Business Object: **Asset**

All business objects in arbitrary level of maturity, intended for continuing the process or reuse in other process instances.

- raw footage material
- fully completed product
- archived product
- publication plan of any maturity
- last year's viewing rates on the Eurovision Song Contest

Process: **Retrieval**

All activities to provide a reusable business object from a stored **Asset**.

- copying a set of files to a folder for cutting
- retrieving a documentary from the archive
- retrieving last month's download counts of an app.

Enabler: **Asset Store**

Storage for value bearing business objects, long-term or short-term.

- a TV archive
- a radio archive

- a file exchange and storage system during production
- a database for user reactions

Process: **Preservation**

*All activities to preserve a business object in an **Asset Store** for later use,*

- saving an edited film from an editing system to the working folder
- archiving a Product to the archive in an archival information package including additional metadata (transmission data, texts, etc.)
- transcoding from obsolete data formats to new ones, transferring to new media (e.g. new LTO generation) and storing in archive
- storing the aggregation results of user clicks on a news site in a database for user reactions

*Note: **Preservation** may also be applied to **Publication Plans, Orders, Rights** or **Resonance Event** data;*

Process: **Consumer Licensing**

*All activities in marketing, selling, producing and distributing **Consumer Licences**.*

- marketing a pay-per-view ticket for a movie and selling it to a consumer
- charging the fee for public service media
- producing a SmartCard with a licence key and sending them to consumers

Business Object: Consumer Licence

*A permission to consume a **Media Service**, a **Product** or any part of it.*

- a permission to watch a pay TV service is physically granted by a SmartCard with a key for decryption of the received satellite signal to the consumer;
- a permission to stream a movie from a VoD offer to consumers in country A, but not in country B, is physically granted by checking the geographic location of the consumer.

Annex A: Refining the Processes Along the Business Objects

A1 Top Level

Figure A1 shows the top level from which the model is initiated.



Figure A1: Top level as starting point for refinement

A2 First Refinement

Figure A2 shows an initial refinement splitting the Digital Media Service Provisioning process.



Figure A2: First refinement

The Digital Media Service Provisioning process is divided by the Product into two sub-processes.

In Digital Media Creation, the Product is created. It is made available to consumers through the Digital Media Access process, so that the Consumption Event is enabled.

A3 Second Refinement

Figure A-3 shows a second refinement splitting the Digital Media Creation and Digital Media Access processes.



Figure A3: Second refinement

Processes are further divided by the business objects Order, Rights and by Media Service.

Planning results in determining which Rights must be acquired or considered for a Product and which Orders for creating or acquiring Products are placed.

Production transforms the Orders into actual Products. By subsequent Publication, the Product is released, assigning it logically and physically to a Media Service.

With the physical Distribution & User Access the Product is now accessible for the consumer and results in a Consumption Event.

A4 Third Refinement

The third refinement shown in Figure A4 splits the Planning, Distribution & User Access and User Experience & Analysis processes.



Figure A4: Third refinement

Processes are divided along Publication Plan, Audience, Bundle, Licence and Resonance Event.

The planning phase is divided into two processes: a Publication Planning process resulting in a Publication Plan. This is the input for the second phase, the Commissioning to acquire the

necessary **Rights** and the actual **Order** for the **Production / Acquisition** of content.

Distribution & User Access is split by **Bundle**. **Distribution** results in a **Bundle**, which in turn is the input for the **User Access** process.

Finally, **User Experience & Analysis** is split by **Resonance Event**. All user activities result in **Resonance Events**, which in turn is the basis for **Analysis**.

Annex B: Continuous Description of Processes and Business Objects

This Annex provides a continuous description of the core model by emphasizing the “flow” character of the core model shown in Figure B1.

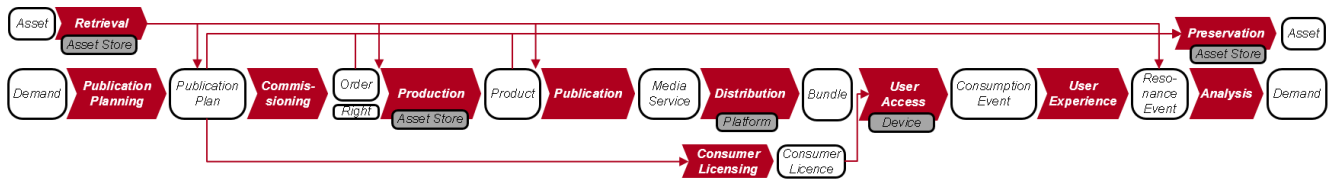


Figure B1: Core process model

The important idea in **Publication Planning** is that a **Demand** is transformed into a **Publication Plan** including the targeted **Audience** and that this is the input for **Commissioning**.

Commissioning is the transformation of a **Publication Plan** into an **Order** for **Production**, which is a common part of the business process in most industries. Acquiring or clarifying the **Rights** to use content is also a result of **Commissioning**.

Within **Production** there are activities such as acquiring raw material, by buying, pre-producing, retrieving, contributing or by **Retrieval** from an **Asset Store** (e.g. the archive). There are also the post-production, aggregation of parts such as audio tracks, photos, subtitles, billboards, credits, ad boards, scenes, items, etc. and the final approval of the product.

The **Production** results in a **Product**, which represents an editorially complete package (usually a file package) with approved quality (technically, legally and editorially OK). A **Product** may range from a multi-item programme to a single post on a social network. The inner structure of a **Product** can be very complex. However, the structure is outside the scope of this model.

In **Publication**, the **Product** is aggregated with other **Products** to become a compilation named **Media Service**. It represents a content/time/spatially controlled and recognizable compilation (e.g. by the logo of TV channel). The last activity in the **Publication** generates the appropriate physical format as the input for **Distribution**. From here on, the **Product** is not changed, regarding content, format or compilation.

The **Distribution** sums all activities that provide access points for the **Media Service** to the user. The **Distribution** represents both the linear (i.e. distributor triggered) broadcasting, as well as the non-linear distribution on-demand (i.e. user triggered). It employs a **Distribution Platform** such as DVB-S, DVB-T, the internet with a CDN, the World Wide Web and social networks. The result of the **Distribution** is a **Bundle** (a set of **Media Services** with common technical mode of access). A **Bundle** is physically present at the location (or within the reach) of the **Device**. This corresponds, for example, to the DVB-T signal at the output of the receiving antenna or to an HTTP/S access point in the output of a DSL router.

The user can now access the **Bundle** in the **User Access** process with an appropriate **Device**. Employing a **Device** as the **Enabler** (e.g. TV set, browser+website, app), he selects a **Media Service**, then a **Product**, has it decoded and gets it presented.

If the consumer is authorized by a DRM agent module in the **Device**, he is finally allowed to consume the **Media Service** or the **Product**. The consumption is described in a **Consumption Event** with attributes.

Whilst consuming, the user executes activities that are described in the process **User Experience**.

User activities are considered as User Experience, if they are executed *because* of the consumed **Product/Media Service**: this can be in the simplest case that the user consumes the **Product** up to the end, or that he switches to consume another **Product**. In other cases, he can comment, like, share, etc. and actually give feedback. Each of his activities leads to **Resonance Events**, e.g.: clicks, likes, shares, tweets, comments or satisfaction ratings (possibly about form and/or content) over the **Device** that is used to consume, about the circumstances of consumption (at home, on the road, alone, with family, with friends, high resolution pictures, well/poorly heard, complicated content, understandable/incomprehensible content, emotional/neutral narrative form). This is described consistently from the perspective of the user in many parameters that a **Product** has.

The **Resonance Events** can be very diverse and numerous. Therefore, appropriate technologies (e.g. Big Data) are required to support the **Analysis** process. The **Analysis** may result in new **Demand** objects.

Retrieval is the inverse process of **Preservation** resulting in e.g. a **Product**, a less mature precursor of a **Product**, planning data or even historical **Resonance Event** data.

B1 General Remarks on Model Application

Process steps can be optional if the activities contained are empty under certain conditions. For example, depending on **Product** type, the **Publication Planning**, **Commissioning** or **Production** can be dispensable, or the processes are comparatively very small and uncomplicated.

All refinement stages between the basic model and the core model are valid and applicable in their own right. It only depends on the use case, insofar as which refinement level is helpful.

Annex C: Application Examples of the Core Model

C1 Live UEFA Champions League Game

The use case “Live UEFA Champions League Game via TV, live stream, ticker, app and Twitter” is modelled in Figure C1. Starting from the simplified model after refinement, each **Business Object**, **Process** and **Enabler** is instantiated as a concrete object. E.g. the business object **Demand** in this case is instantiated as the strategic goal “More Live Sports” and the event “CL 1/8-Final”. Or, the process **Publication** is instantiated in several different forms, from a simple “Posting” on Facebook to a complicated “Aggregation”, “HD live Signal Creation” and “Conversion” to a compatible signal for “SAT Distribution”.

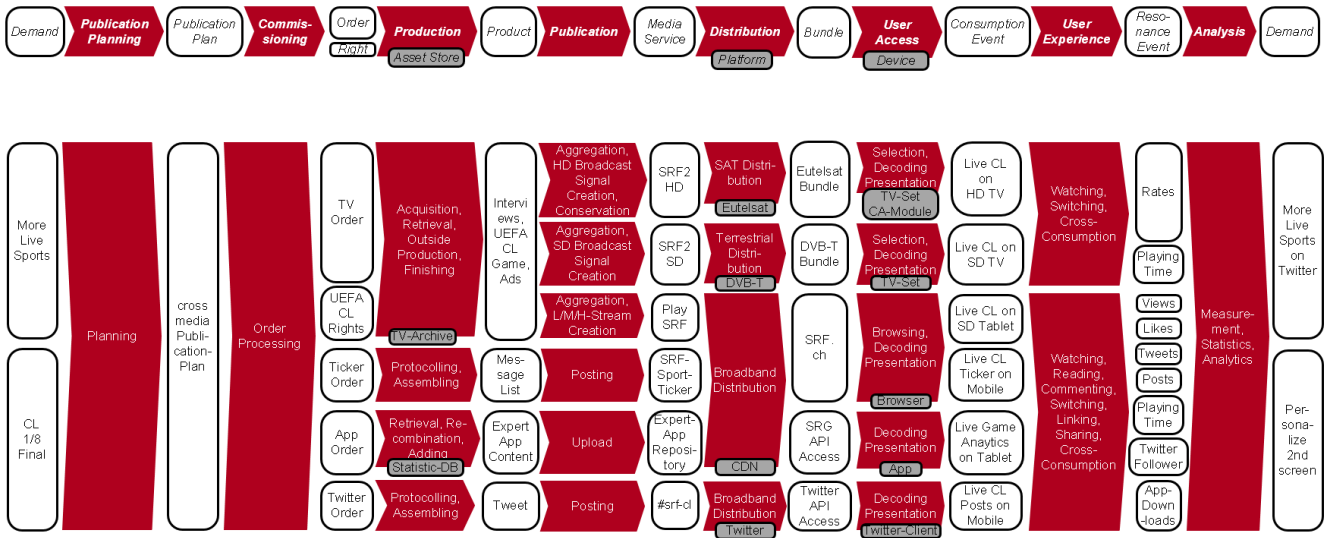


Figure C1: Modelling a use case of multimedia coverage of an event

This use case provides valuable insights into the possibilities of reusing business objects for an increased offer of **Media Services**. It shows dependencies and therefore gives a structured view for planning resources. Finally, the model itself proves to be applicable for such a use case.

C2 James Bond Movie with Targeted Advertising

The use case “James Bond Movie with targeted advertising” is modelled in Figure C2. **User Access** is modelled via an “OTT” **Device**. Therefore, the identity of the consumer is known to the service provider and the service provider can insert an advertisement targeted at the individual consumer.

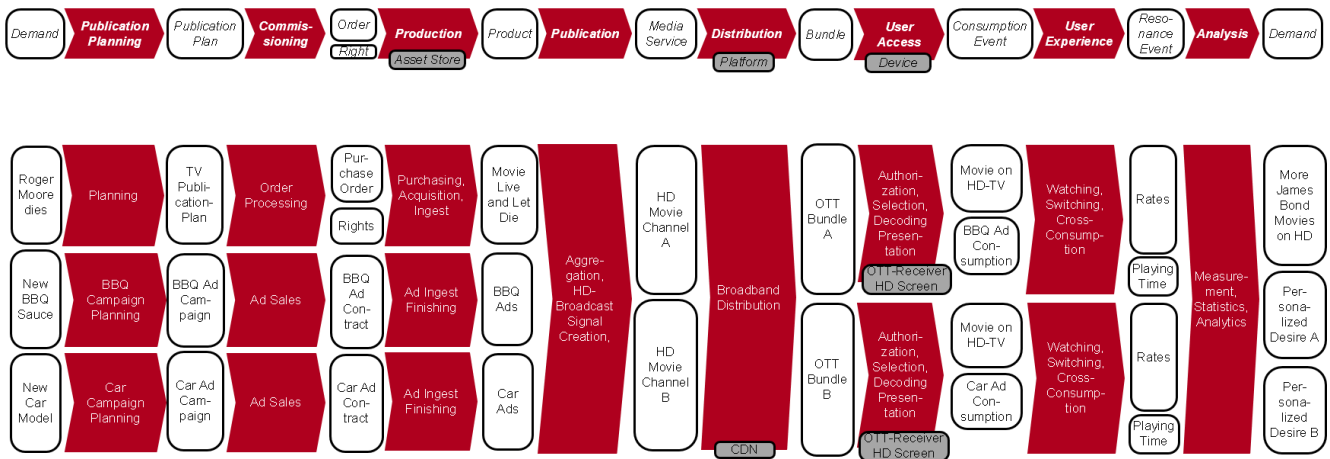


Figure C2: Modelling a use case of targeted advertising

This is supported by data from the OTT receiver. The data is used within the **Publication Process** to control the aggregation of the **Media Service**.

C3 User Generated Content in Talk Show

The use case “User Generated Content in Talk Show” is modelled as shown in Figure C3. A political talk show ahead of upcoming elections offers live discussions and pre-produced items. It is accompanied by interacting with an audience through a Facebook account for “Votes and Voices” and Twitter tags “#election2017” and “#firstvoters2017”. Users generate content by Posting comments, images, clips, etc. This content is being reused as near live content in the talk show.

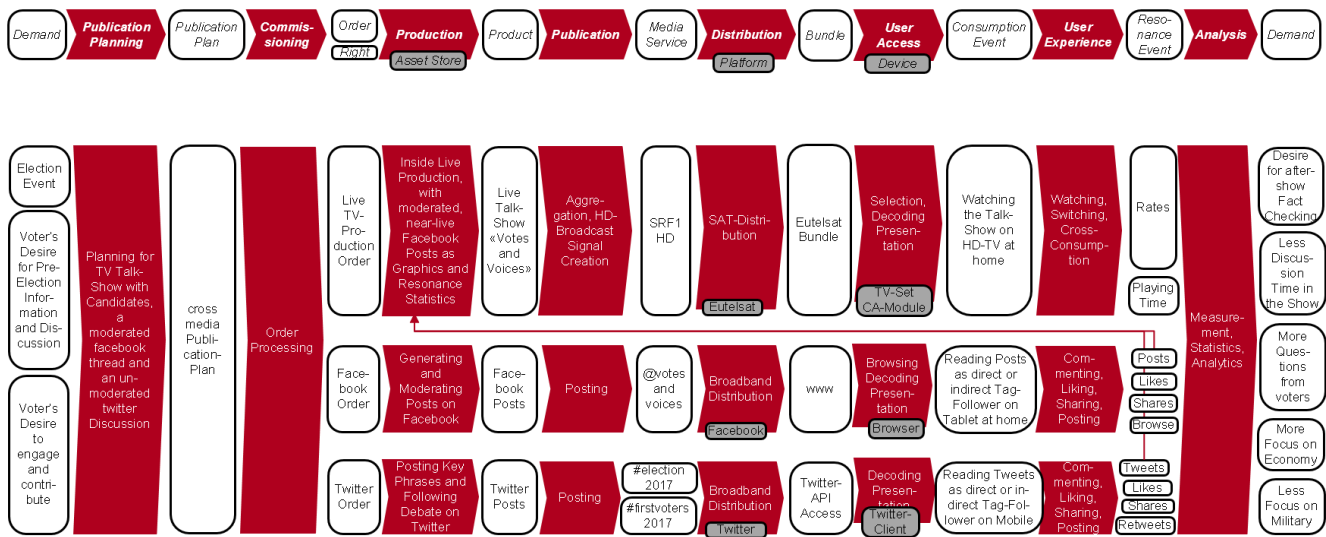


Figure C3: Modelling a use case of user generated content

C4 Linking to Detailed Processes

Process documentation is a widespread reality in the broadcast industry. In this use case from “TPC” (production subsidiary company of SRG) the process documentation is already accomplished (and is by far more detailed than in the following Figure). The task here was to find how TPC’s processes compare to each other (same input requirements, same output complexity?) and how they fit in with all the other business processes.

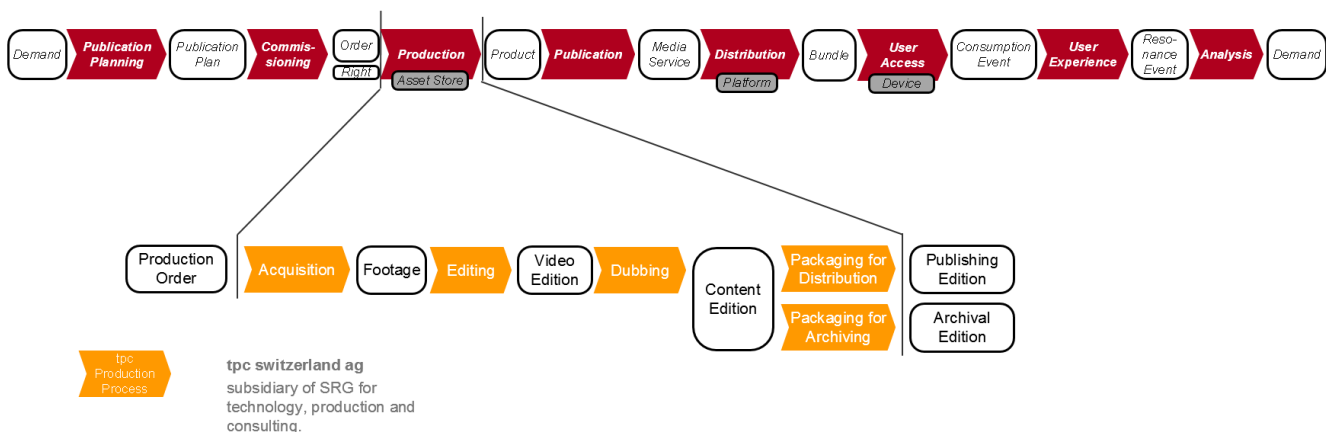


Figure C4: Example for linking to detailed processes

The simplified view shown in Figure C4 allowed an identification of the scope of TPC’s processes. The linked vertical lines delimit the referring scope. Additionally, the model makes it easier to find out which business objects were equivalent in two different TPC processes and which were not.

C5 Metadata Growing During the Process

Business Objects are associated to referencing and describing data for better management over their life span (Figure C5). These data objects are instantiated and/or filled up during the life of a business object. This use case is looking for a way to visualize the instantiation and filling of data objects over a period of time in the course of a **Business Process**. Firstly, this requires a data model representing the **Business Objects**, and secondly, a timeline based graphic. Here's the full process over a (idealistic) timeline:

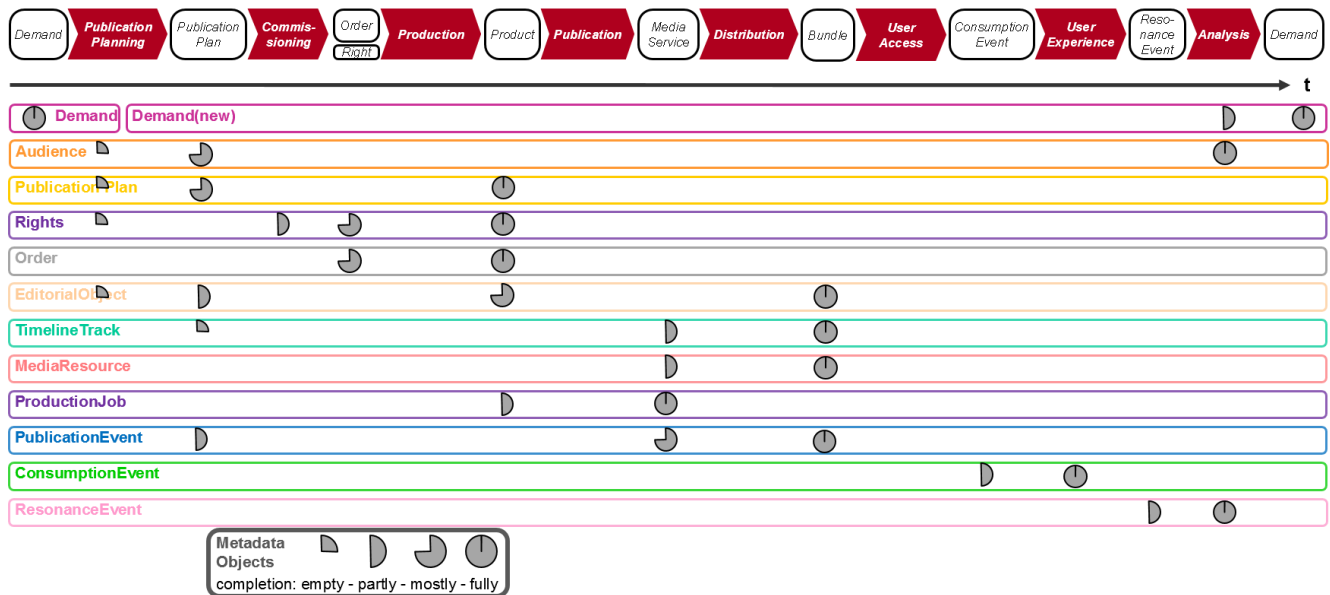


Figure C5: Growing Metadata during a process

Below the process model, every class from the data model has a lane. In this example CCDM⁴ was chosen as the data model. Instantiation of a data object is represented by a quarter circle segment. As the process continues, the data objects get filled up and the circle segment is set to half, $\frac{3}{4}$ and full at the appropriate time within the process.

This is of course only a symbolic representation and does not implicate a continuous timeline. In fact, timelines are only steady for single activities (“activities” in the BPMN⁵ sense). Nevertheless the question as to which time during a specific process a data object is valid and to what extent it is filled, is of frequent interest for development and integration staff. This justifies the simplification above.

C6 Linking to a Data Model

The process model has a strong focus on the **Business Objects** that carry the business value. Value management is obviously crucial for an enterprise's success. It is conducted on the data representing or describing the **Business Objects**. Therefore, the data model (Figure C6) must be a comprehensive representation of the **Business Objects**.

In this use case the CCDM 1.1 (inner box) data model was not comprehensive enough and needed to be extended. Linking the classes of the data model to the **Business Objects** resulted in extensions now defined CCDM 2.0 (outer box).

⁴ see EBU TECH 3351: Class Conceptual Data Model

⁵ see https://en.wikipedia.org/wiki/Business_Process_Model_and_Notation

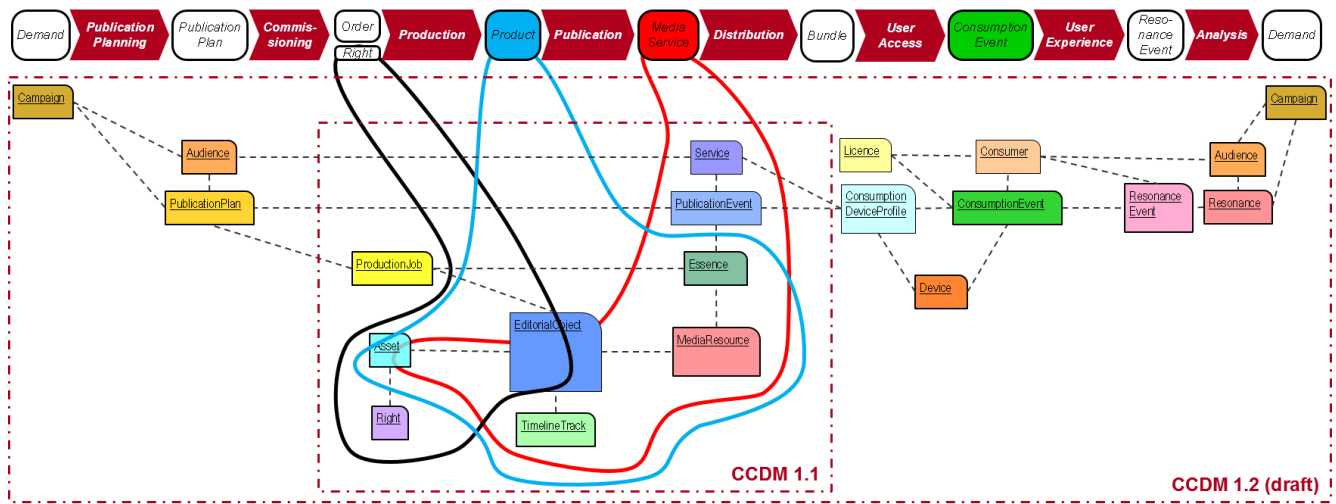


Figure C6: Assessing a data model