



T//ENCE

ARCHITECTURAL CONSIDERATIONS FOR THE SYSTEM LANDSCAPE OF THE DIGITAL TRANSFORMATION

The Twelfth International Conference on Creative Content Technologies
October 25 to 29, 2020, Nice, France (or, more precisely, on video)

Dr. Hans-Werner Sehring, hans-werner.sehring@tallence.com

Tallence AG, Hamburg, Germany

// Dr. Hans-Werner Sehring

The author / speaker

Hans-Werner Sehring works as a software architect at Tallence AG.

The Tallence AG provides technology and management consulting for the digital transformation. We support our customers to use digitization to their advantage and to create competitive advantages. The benefit for the end customer is our guiding principle.

Hans-Werner works on digital transformation projects with clients from various industries for over 20 years. He served for more than 10 years as a researcher and lecturer at the Hamburg University of Technology, and at Hamburg's technology transfer institution.

He is engaged in IARIA activities as author, panel moderator, keynote speaker, steering and program committee member, and as the editor-in-chief of the International Journal on Advances in Intelligent Systems.

Hans-Werner became a IARIA fellow in 2012.



// Interests and Areas of Research

Hans-Werner's focus

Hans-Werner works in areas including content management, ecommerce, digital marketing, and communication.

He did research, published, and taught in the areas of

- > software engineering,
- > software architecture, and
- > model-driven software development,

in particular for

- > data-intensive information and content management systems,
- > e-learning environments, and
- > mobile solutions.

Technological expertise includes

- > **Content Management Systems (CMSs)**
- > **Digital Asset Management (DAM) systems**
- > **ECommerce platforms**
- > **Product Information Management (PIM) systems**
- > **Customer Relation Management (CRM) systems**

// Agenda

An outline of this talk

The **1 Digitalization or Digital Transformation** describes the current trend of service providers becoming more engaged with their clients by means of information and communication technology.

Typically, digital transformation projects are supported by digital agencies like **2 Tallence**. We bring companies up to speed with organizational and technical changes that establish the digital transformation.

While digital transformation is about businesses and the interaction with their clients, **3 Information and Communication Technology** is the enabler of every respective change.

There is a variety of available software products and services. Possibilities opened up by existing software must not, however, be the source of requirements. As with any software solution, **4 Architecture** is the means of deriving a solution that combines components in such way that it meets the goals and requirements.

An **5 Outlook** on future directions supports the work on architecture for digital enterprise solutions.

01

DIGITAL TRANSFORMATION

Λ //

// Digital Transformation

The Digital Transformation

- > Digitalization or Digital Transformation describes the current trend of
 - > companies, public institutions, and other service providers
 - > becoming more engaged with their clients by means of information and communication technology.
- > It aims at bringing to the online realm:
 - > The way **users interact** with services
 - > The way **services are fulfilled**
 - > The way **overall businesses** work
- > Different functionalities and technologies are found on the digital technology landscape:
 - > Interaction components: Websites, Apps, IoT, ...
 - > Service Components: CMS, Commerce, PIM, DAM, CDN
 - > Tasks: Rendering/transcoding, playout, transaction execution, tracking, targeting, testing, retargeting, ...

// Digital Transformation Became a State Affair.

The Digital Transformation.

- > Digital transformation proceeds at **high pace**.
- > Germany, in particular, is lacking behind. The current government came up with an action plan, even dedicated a ministry to the topic.
- > Other countries took equal steps.
- > The use of digital channels is considered a **competitive advantage**.



Bundesministerium für Verkehr

// Digital Transformation Applications.

The Digital Transformation.

- > The digital transformation appears in many ways.
 - > “Old economy” companies utilize the new **marketing, sales, and support** channels.
 - > “New economy” companies base their business on the digital channels. Startups use them for **innovative business ideas**. This may apply to **physical** or to completely **digital products and services**.
 - > Public institutions offer **eGovernment** services.
 - > The educational sector uses **eLearning** and **distance learning**.
 - > Etc. etc.
- > They do so with the help of digital agencies like...

02

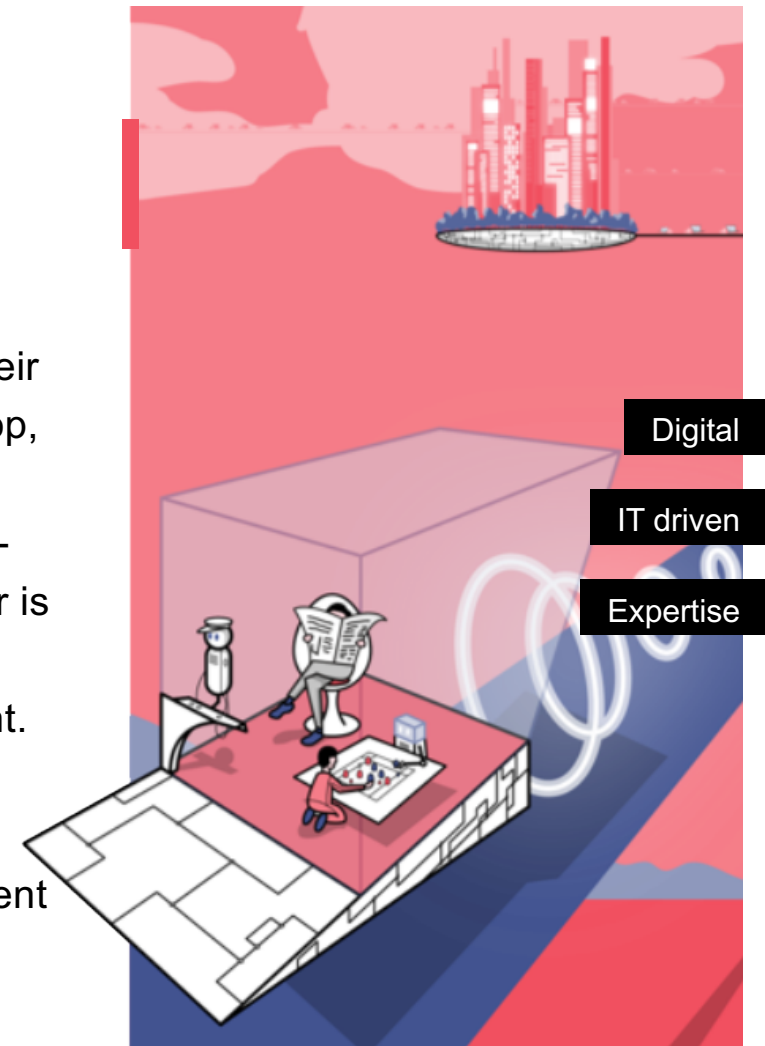
TALLENCE

Λ //

// Tallence AG

The experts for digital transformation

Tallence AG is a technology and management consultancy for digital transformation. We support our clients to use digitization to their advantage and to create competitive advantages. We advise, develop, and take leadership. We proceed in a concrete and result-oriented manner. Whether international technology group, traditional medium-sized company or the public sector: The benefit for the end customer is always the guiding principle and drive of Tallence. We ensure this through real expert performance and the highest level of commitment. Our clients come from industries as diverse as telecommunications, information, media and energy. As Tallence AG, we work with more than 130 IT developers, machine learning specialists and management consultants in Hamburg, Frankfurt, Marburg, Darmstadt, Görlitz and Karlsruhe on pioneering topics in the digital economy.



03

INFORMATION AND COMMUNICATION TECHNOLOGY FOR THE DIGITAL TRANSFORMATION

// Technology Considerations

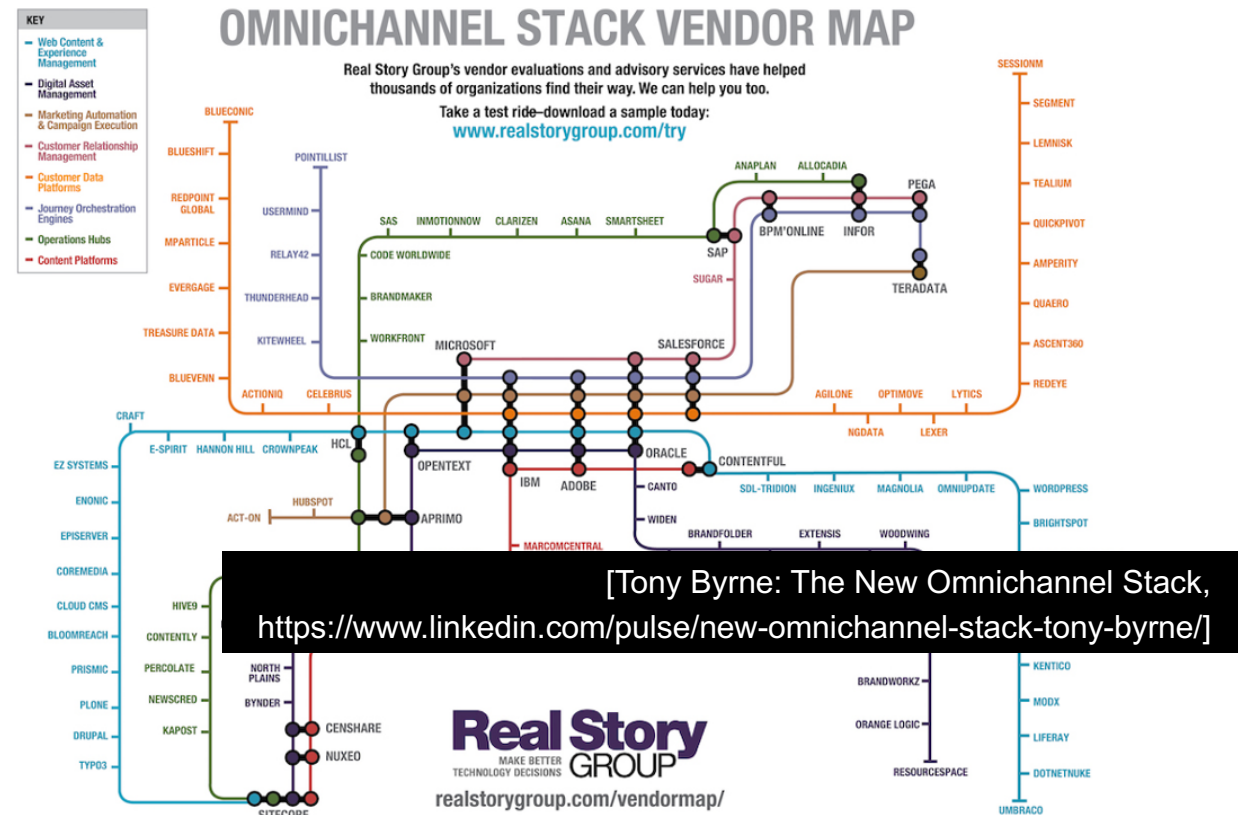
Software components that build the foundation of digital solutions

- > There are many classes of components that are currently used as the foundation of digital solutions.
- > They operate on different layers of digital solutions, and they provide different functionality, like
 - > **Content Management**
 - > **Presentation** of content as documents and of applications
 - > **Document processing**, e.g., to adapt presentations for specific uses
 - > **Playout**, i.e., the delivery of documents to viewers
 - > **Transaction management**, e.g., online purchases
 - > **User interaction**, e.g., handling user input in the course of a dialog
 - > **Backend systems and data**, e.g., product catalogs or warehouse management
- > We list four typical examples for the discussion in this presentation.

// RSG Product Map

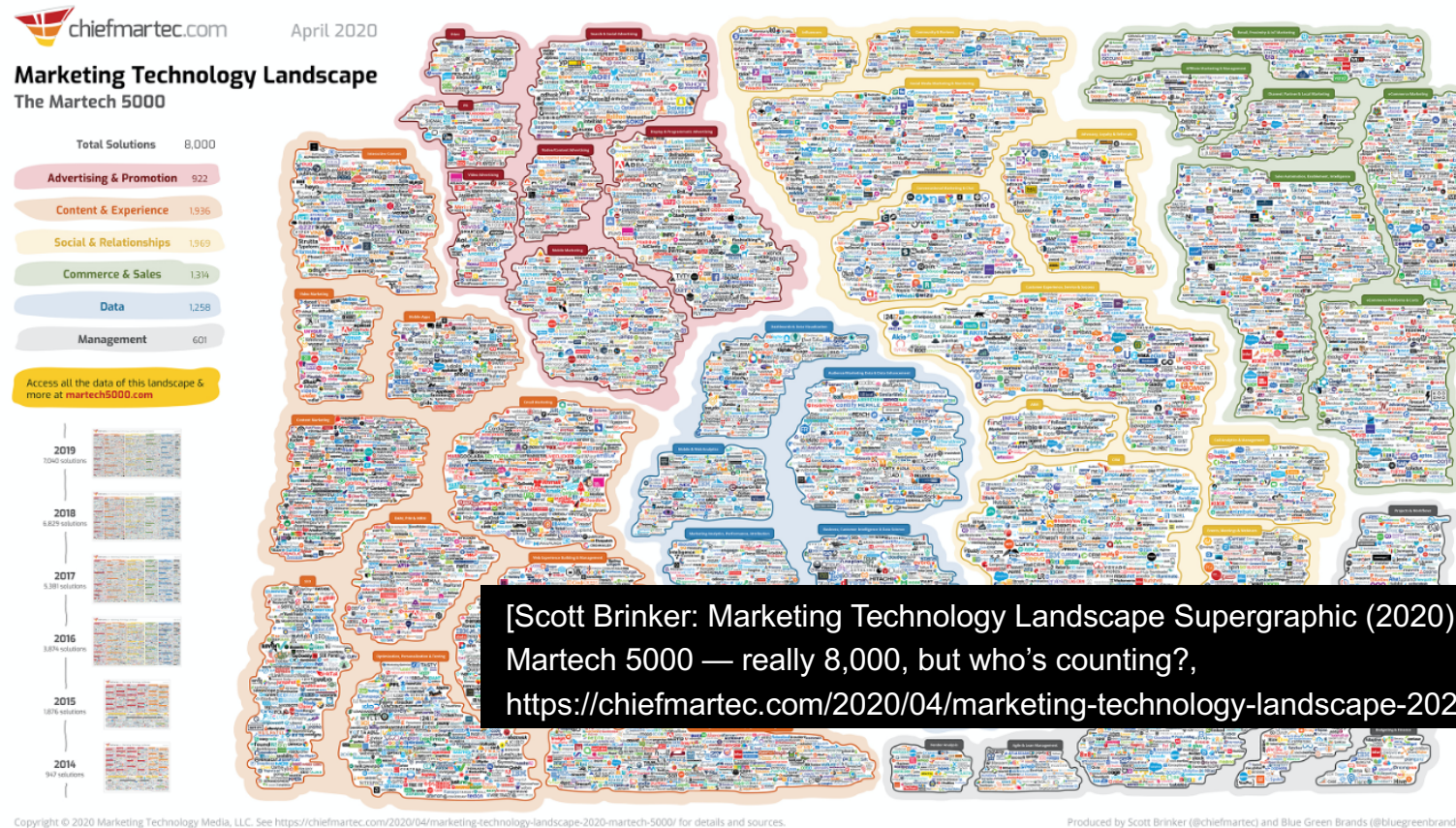
Analyst's selection of technologies

- > For every class of component, there is a range of software products and services filling that role.
- > The Real Story Group (RSG), for example, names quite a few.



// Or, More Complete: the “Supergraphic”

There is a plethora of components available – and the number is constantly growing

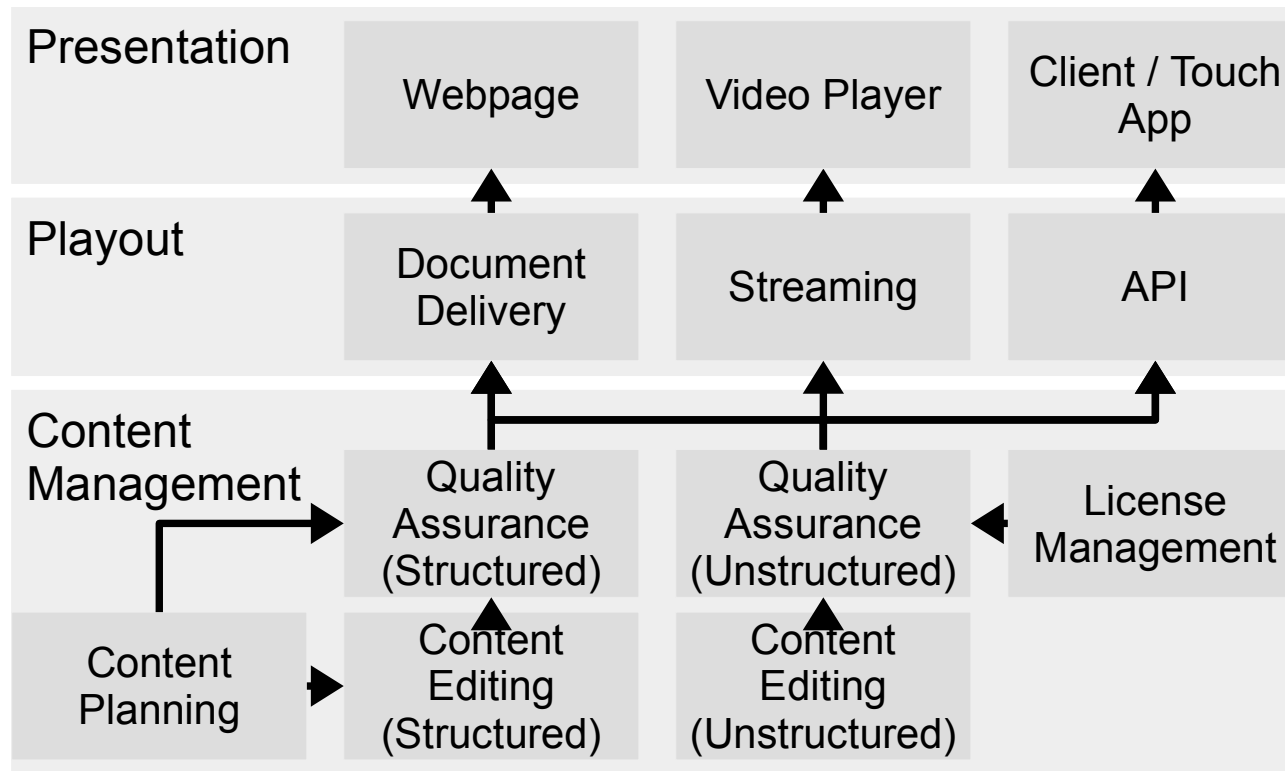


// Content Publishing Components

Everything that is required to manage content, produce media files, and to distribute them

- > Content is an important ingredient to every digital solution (“content is king”). Consequently, several component classes deal with content.
- > Content management:
 - > Content Management Systems (CMSs) for structured content
 - > Digital Asset Management (DAM) systems for unstructured content
 - > Content planning and campaign management tools give direction to content production.
- > Other sources of data also provide content, including product information management (PIM), and enterprise resource planning (ERP) systems.
- > Content is distributed by playout components like rendering engines, web servers, application servers, etc.
- > Document processing is employed to adjust presentations, e.g., to adapt images to different devices.

// Content Publishing Component Integrations



Examples:

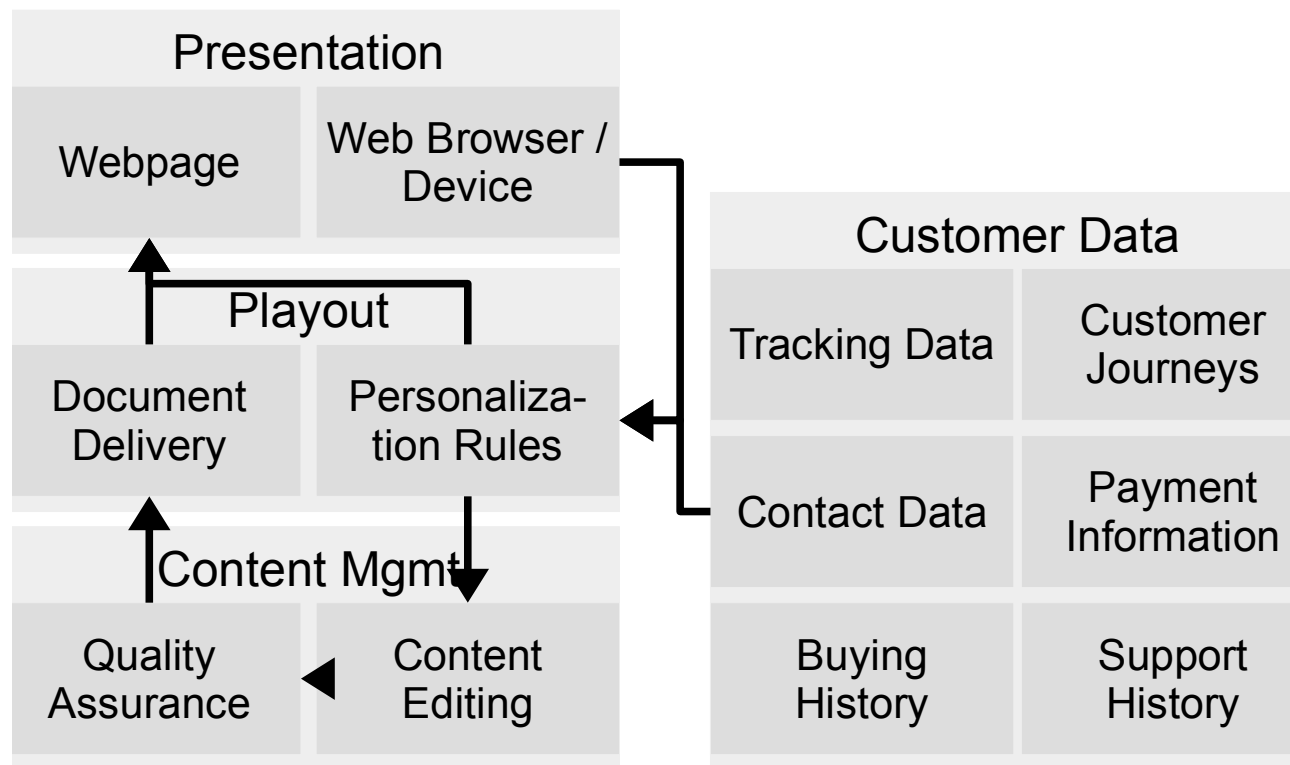
- > Different content management systems need to be integrated with respect to the lifecycles of the content they manage.
- > APIs used for applications include the utilization of content.
- > The throughput from streaming servers is measured and fed back by video players.

// Personalization Technology

Targeting content and content representations to Contexts, Audiences, and Single Users

- > Personalization technology is used to ~~adapt~~ content and content presentations for
 - > **target groups** / audiences
 - > specific **user groups** (e.g., employees of one company that is a customer)
 - > individual **users**
- > Personalization has to be applied ~~dynamically~~ because it takes the requester and context into account.
- > Personalized presentations can be ~~explicit~~ (defined by user) and implicit.
- > ~~Implicit~~ personalization can be based on different input:
 - > past user **behavior**: actions of the users are recorded by means of tracking or similar
 - > customer **data** that has been stored during business processes, e.g., past purchases
 - > **context** of the user, e.g., country, language, time of access, device, etc.

// Personalization Technology Integration

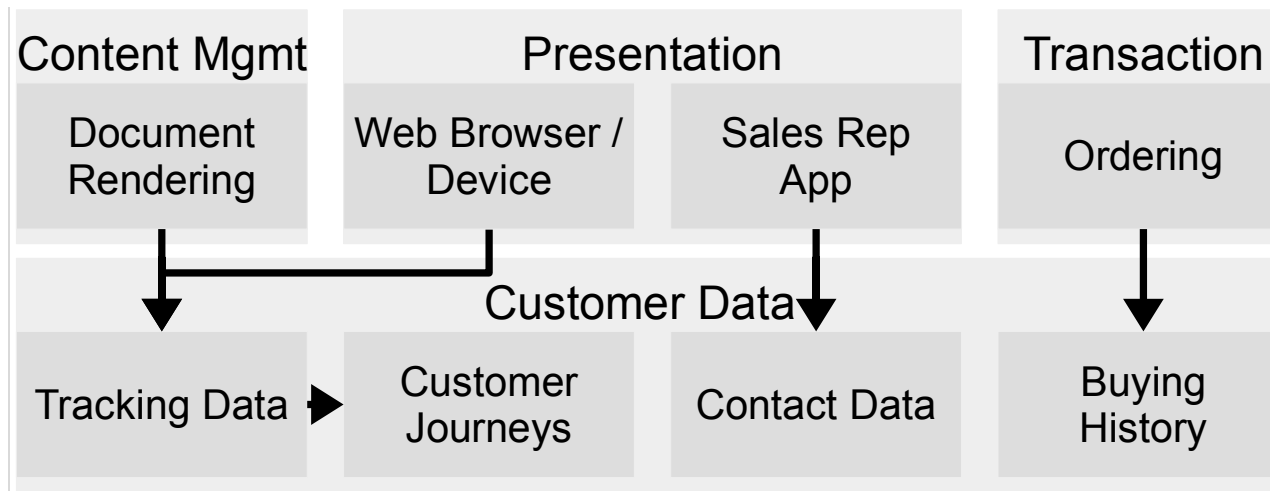


Examples:

- > Personalization rules are evaluated on content.
- > Personalization rules can take behavioral data into account.
- > Personalization rules can take customer data into account.

// Customer Data Management Technology

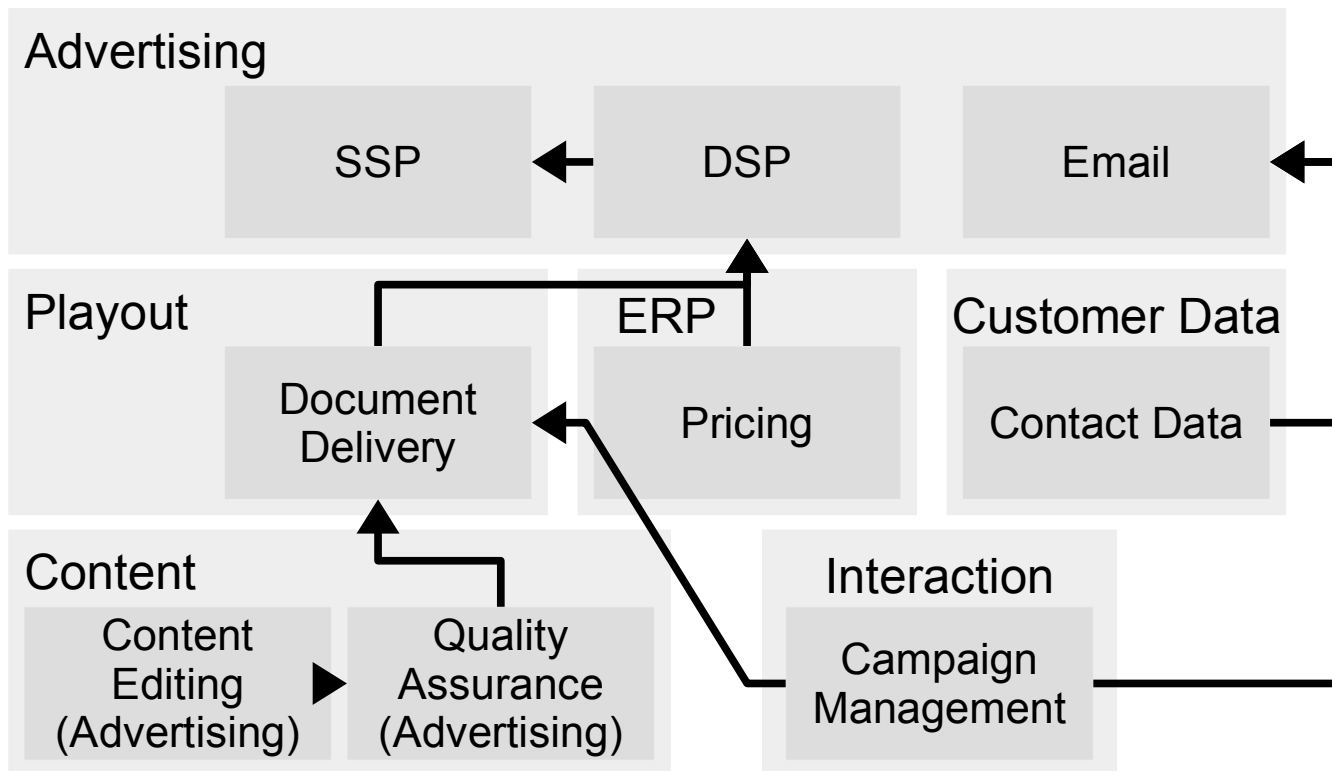
Understanding users by collecting data



- > Customer data has an impact on many operations of the digital platform.
- > Traditionally, customer relationship management (CRM) systems maintain customer information.
- > Customer data platforms (CDPs) extend the view on a customer by incorporating information coming from all channels.

// Retargeting

Focusing users on critical customer journeys



- > Institutions want users to complete critical customer journeys. I.e., those which constitute the main business processes.
- > When users deviate from such customer journeys, they shall be brought back on track by means of retargeting.
- > Typical means of retargeting are email reminders and banner ads.

04

AN ARCHITECTURE FOR DIGITAL TRANSFORMATION SOLUTION LANDSCAPES



// Architecture of Digital Solutions

With the many specialized components that are utilized in a solution come many integration tasks.

In order to be employed, products and services that are based on digital technology have to be orchestrated.

To this end, there need to be architectures that tie together the whole landscape of the digital transformation.

In practice, it is often the case that digitalized systems are created from what is available and can be combined rather than as a solution for concrete requirements.

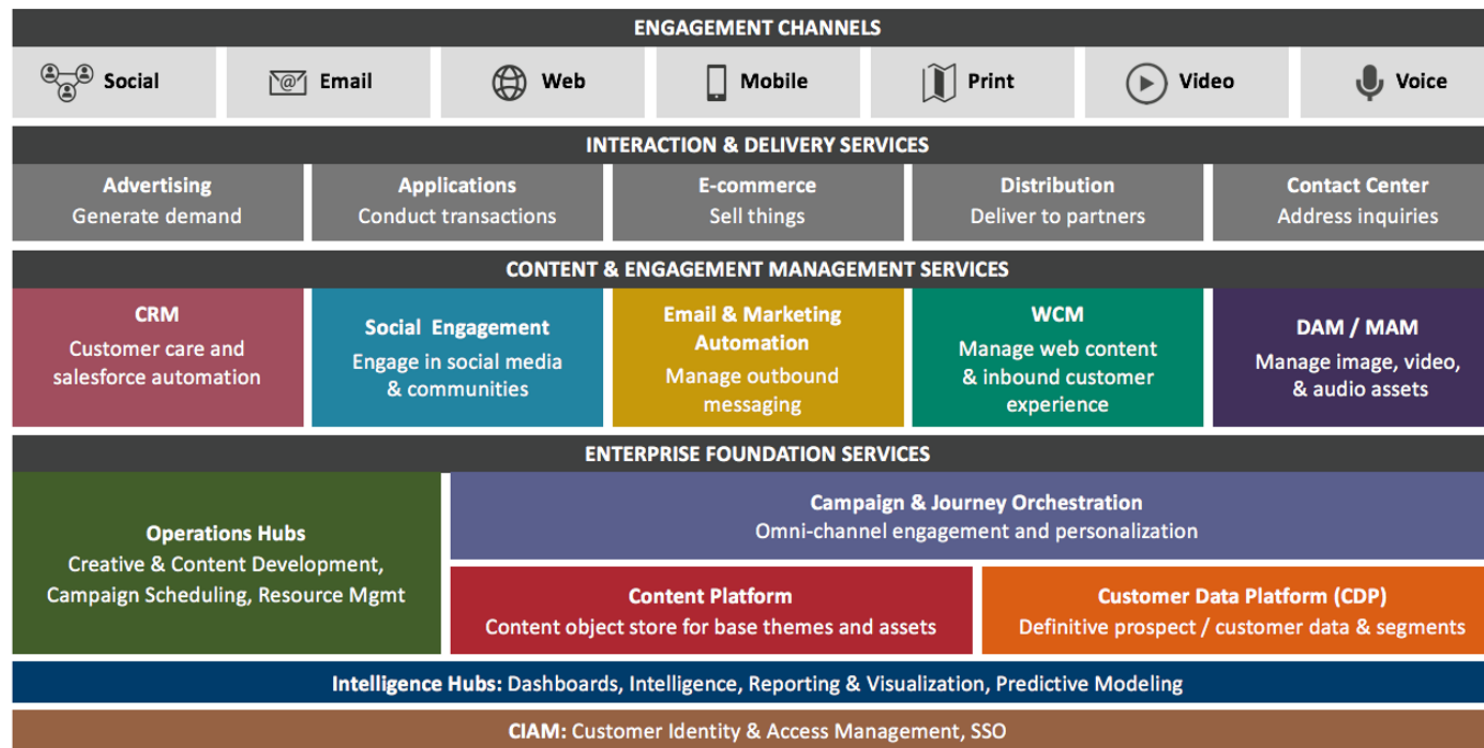
Instead, the technological solution that drives the digitization of an enterprise must be based on clients needs and on business goals.

Architecture work needs to be applied carefully in order to build adequate digital solutions.

// Reference Architecture. Analysts Point of View.

Digital Transformation Components.

The Omnichannel Technology Stack Model



[Tony Byrne: The New Omnichannel Stack,
<https://www.linkedin.com/pulse/new-omnichannel-stack-tony-byrne/>]

Real Story
GROUP

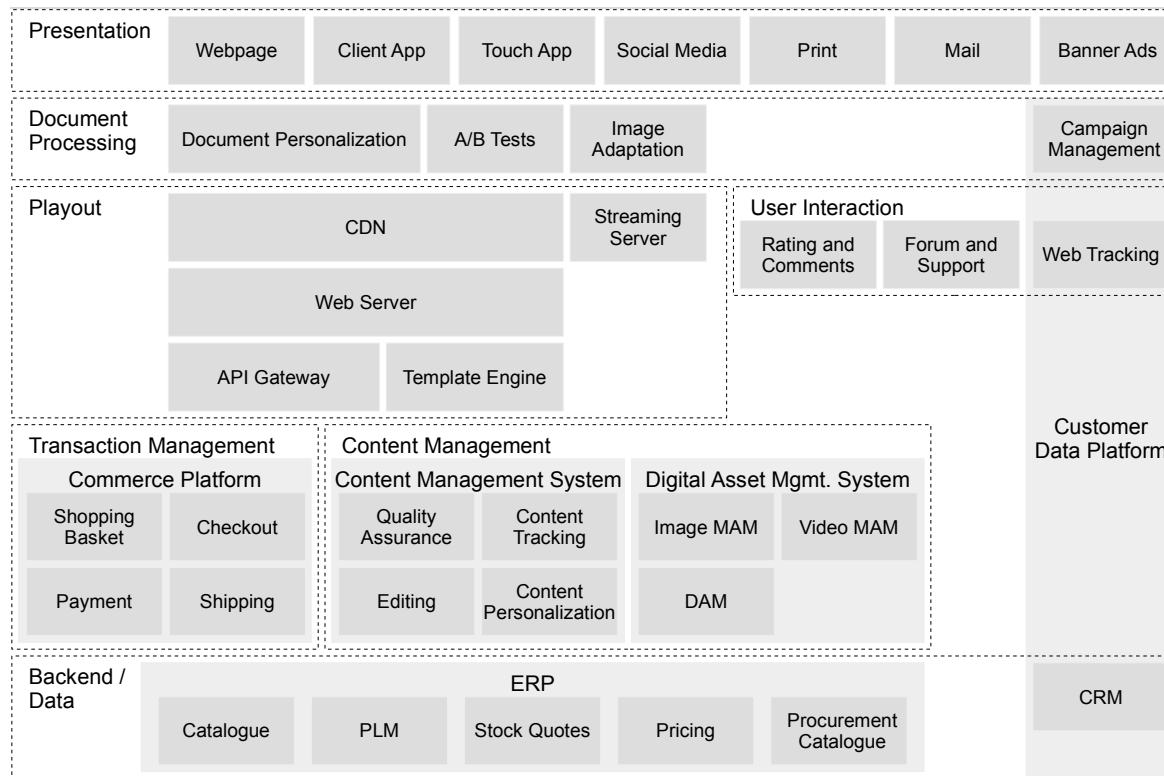
// Notions of Architecture

- > For the sake of clarification:
- > Architecture as a solution of a general problem:
 - > classes of components building blocks, **logical** components
 - > typical component constellations
- > *An* Architecture = system configuration as a concrete digital solution
 - > **concrete** components
 - > component integrations, mapping of logical components to (sets of) concrete components
 - > links to goals and requirements, design decisions, etc.

// Functional Building Blocks of a Digital Solution Architecture

Presentation	Webpage		Client / Touch App		Social Media		Print		Email		Banner Ads					
Playout	Document Delivery		Streaming		API		Interaction		User-generated Content		Product Configuration		Shopping Basket			
Content Management	Content Editing		Quality Assurance		Personalization		Content Planning		Transaction Management		Ordering		Logistics Interface		Support Functions	
Enterprise Ressource Planning	Catalogue		PLM		PIM		Customer Data		Tracking Data		Customer Journeys		Contact Data			
	Stock Quotes		Pricing		Procurement Catalogue				Buying History		Support History		Payment Information			

// Functional Building Blocks Combined in System Configurations



Examples:

- > Content management is provided by a CMS and a DAM.
- > User interactions consist of ratings, comments, forums, and a support database, and they are measured by web tracking.
- > CDP is built from campaign management, web tracking, and CRM components.

05

SUMMARY AND OUTLOOK



// Summary and Outlook.

- > In summary, the digital transformation is driven by technology, and there is an increasing wealth of technology for digitalized institutions.
- > Solutions for digitalized institutions must not be designed by looking at the functionality of available software components only.
- > Instead, solutions are built for business goals at hand in order to achieve competitive advantages.
- > An adequate combination of components can be achieved by means of architecture that follows proven principles but allows designs that are targeted at the business goals.
- > An outlook on the future of the digital transformation is hardly possible. New requirements, and thus products and services emerge constantly.
- > A constant is convergence: E.g., sales, marketing, and aftersales support functions are no longer separated, as are communication channels, no to mention the “real world” and the digital realm.
- > Consequently, future work will continue to not define reference architectures, but to collect patterns for integration tasks.

THANKS.

T//ENCE

Hamburg

Tallence AG
Neue Gröningerstraße 13
20457 Hamburg

T +49 40 36 09 35 100
F +49 40 36 09 35 200
info@tallence.com

Frankfurt/Main

Tallence AG
Walther-von-Cronberg-Platz 1
60594 Frankfurt am Main

T +49 69 401 50 76 60
F +49 40 36 09 35 200
frankfurt@tallence.com

Karlsruhe

Tallence AG
Erbprinzenstraße 23
76133 Karlsruhe

T +49 721 38 13 49 10
F +49 40 36 09 35 200
karlsruhe@tallence.com

Görlitz

Tallence AG
Neißestraße 27
02826 Görlitz

T +49 40 36 09 35 100
F +49 40 36 09 35 200
goerlitz@tallence.com

Marburg

Tallence AG
Am Grün 40
35037 Marburg

T +49 40 36 09 35 100
F +49 40 36 09 35 200
info@tallence.com