The Solution Landscape of the Digital Transformation: Diversification, Integration, and Coherence. ComputationWorld. Keynote. Since 1995. Namics.

A Merkle Company

VENICE, ITALY, 6TH OF MAY 2019

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Agenda.

Today let's have a look at 1 The Digital Transformation. It affects the way our clients interact with their customers, our clients' processes, and finally the client's internal processes. The transformation is supported by digital agencies, like Namics.

On the operational level, there is a demand for 2 Methods and Tools of Digital Transformation Projects.

We shortly introduce 3 The M3L as a framework to put typical 4 Digital Transformation Components into place.

My ongoing work in this area is 5 A Unified Model (and Implementation?) of the Digital Transformation Landscape.

We close with a 6 Conclusion.

FIRST

The Digital Transformation.

Digital Transformation.

- Aims at bringing to the online realm:
  - The way users interact with services.
  - The way services are fulfilled.
  - The way overall businesses work.
- Technology and tasks landscape:
  - Interaction components: Websites, Apps, IoT, …
  - Service Components: CMS, Commerce, PIM, DAM, CDN
  - Tasks: Rendering/transcoding, playout, transaction execution, tracking, targeting, testing, retargeting, …

THE DIGITAL TRANSFORMATION.

Importance.

Digital Transformation Became a State Affair.

- Digital transformation proceeds at high pace.
- Germany, in particular, is lacking behind. The current government came up with an action plan, and even dedicated a ministry to the topic.
- Other countries took equal steps.

Bundesministerium für Verkehr und digitale Infrastruktur

(Federal Ministry of Transport and Digital Infrastructure)

- The use of digital channels is considered a competitive advantage.

Digital Transformation Applications.

- 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.
  - 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…

THE DIGITAL TRANSFORMATION.

Namics.

Bernd Schopp

CEO, Namics

“With a commitment to high quality standards, we lead our customers from vision to reality and thereby enable market advantages and efficiency gains. We focus on the end-to-end user experience and based on this, the right measures on a strategic, technological and operative level.”

Jürg Stuker

Former CEO and Member of the Board of Directors, Namics

“We are pioneers and experts in the field of digital transformation – and we have been since 1995. As an independent, interdisciplinary full-service partner, we work with you to digitize your business models and critical processes. Your long-term success is the focus of everything we do.”

Michael Pertek

COO, Namics

“The requirement for the excellent solutions is the joy of an interdisciplinary coworking in different disciplines. This means the creation of one common solution with different people, perspectives and disciplines. Tolerance and respect for the other's skills and views are always required and they lead to success of our customers and our employees.”

Digital transformation. Changes.

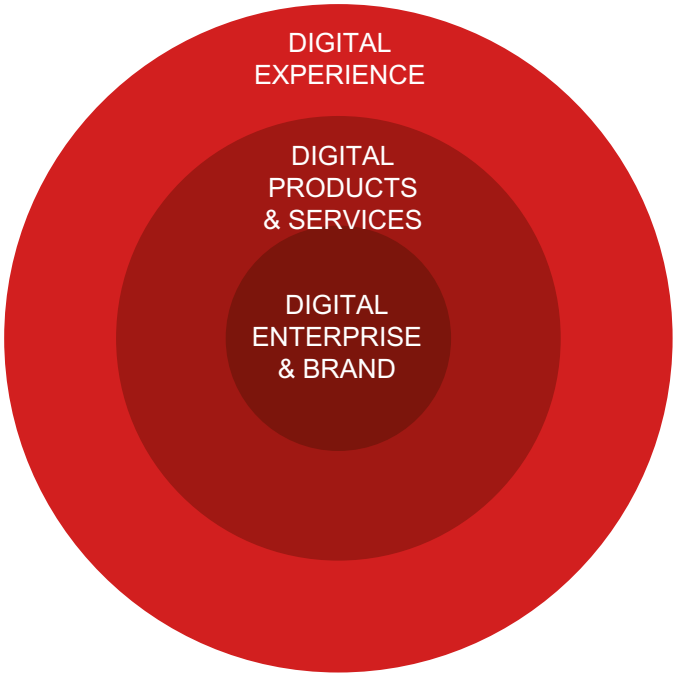
Digital transformation has different implications:

Behavior:
It effects the consumer's expectations, requirements, needs and the behavior.

Products and services:
As a reaction on the changing consumer expectations business models, products and services have to be adapted or newly developed.

Company:
The core of a company is changing regarding processes, organization, employees and culture.

Digital transformation. Dimensions.



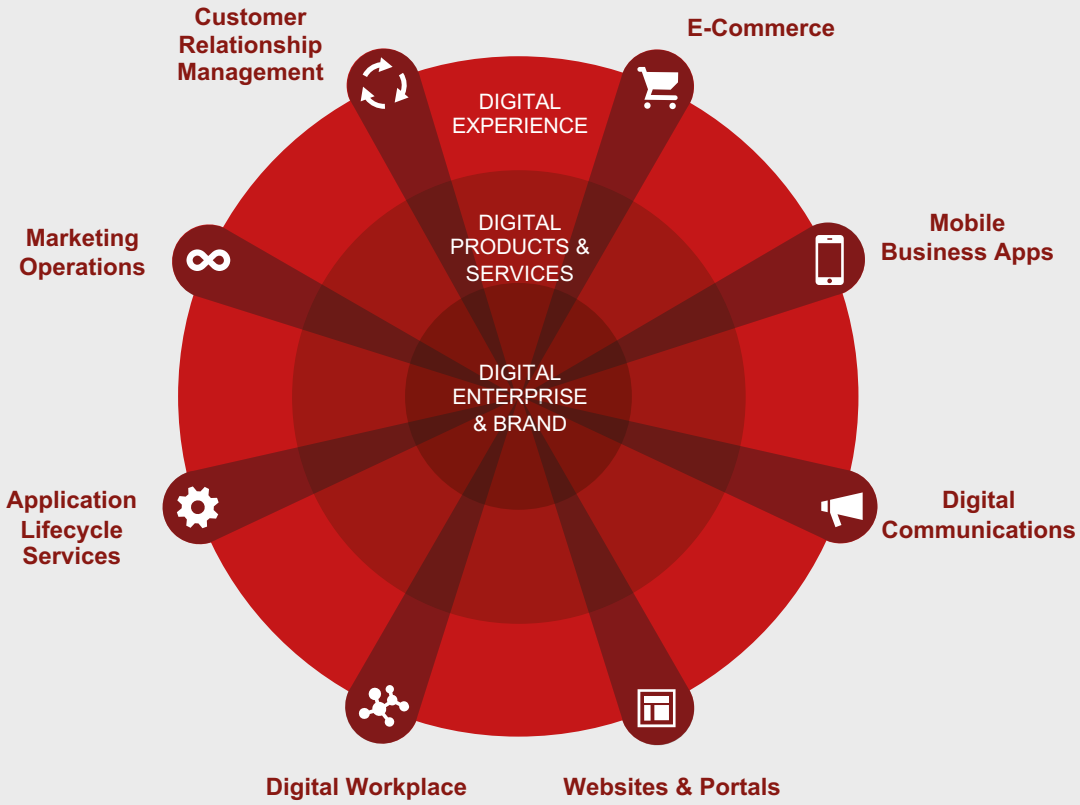
How we define fullservice:

Digital Experience:
We help you create a consistent user experience optimized for all channels – allowing you to identify the expectations of your target group to exceed them with the right solutions.

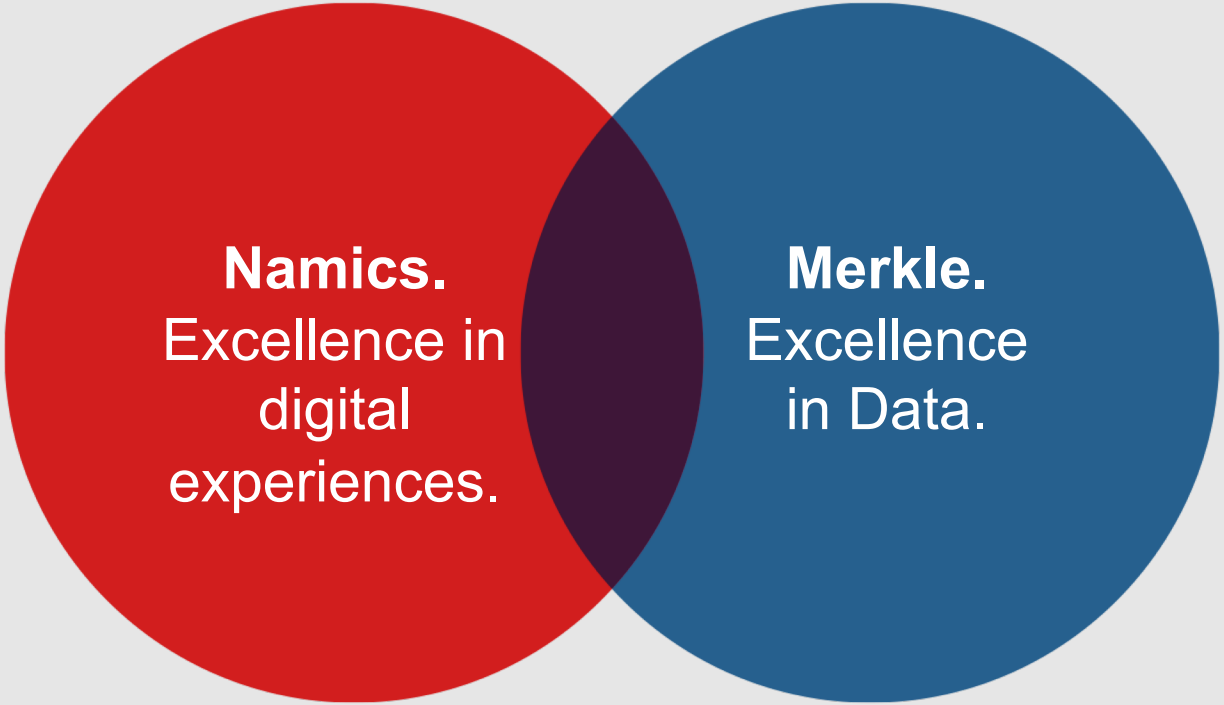
DIGITAL PRODUCTS & SERVICES:
We collaborate with you to implement new business models to conduct successful digital business with a focus on enhancing and developing your products and services.

Digital Enterprise & Brand:
We support you through the whole process of digitizing your brands and organization.

Our services.

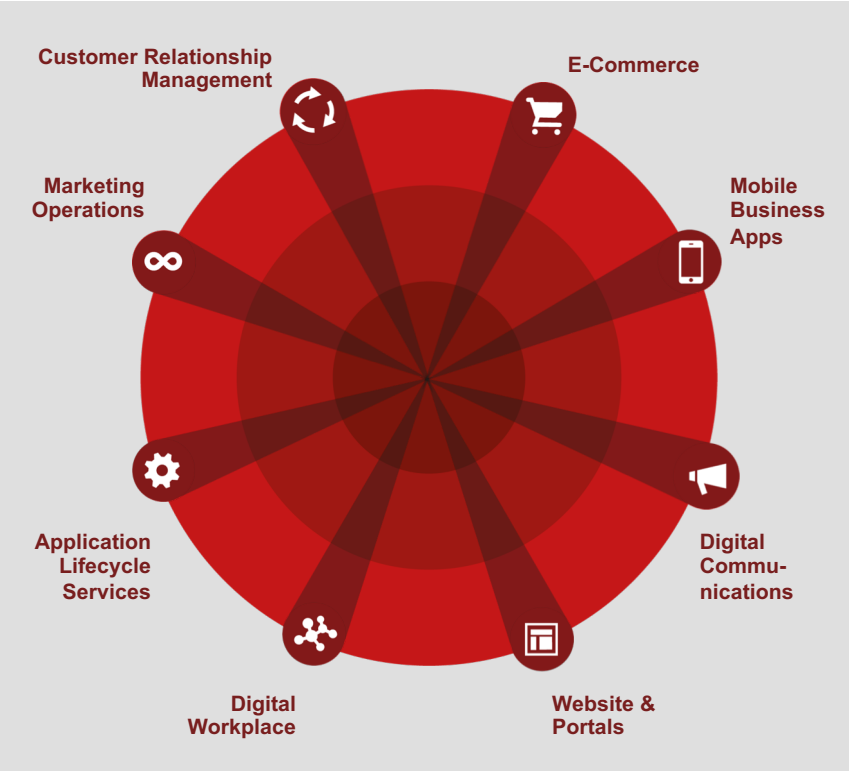


Matching partners.



Our shared mission.

Fullservice. Close proximity. Namics.



Clients love Namics

Over 75% of our customers place their trust in us for more than 3 years at a time

Worldwide network

360° Amplifi CARAT character Fetch firstborn GRAV·I·TY gyro: iProspect isobar mcgarrybowen MERKLE Mitchell MKTG vizeum

Strong Partners

Adobe sitecore SAP salesforce magnolia Drupal celum intelliAd SiteboSystems

Data Expertise. Global footprint. Merkle.

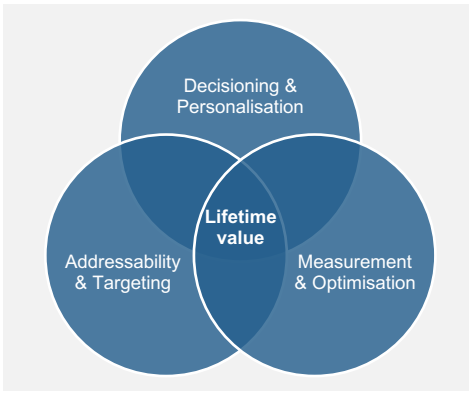
Transformation & Customer Strategy

Addressable Advertising

Personal Experiences

Loyalty & CRM

Data & Technology Services



Strategic Partners

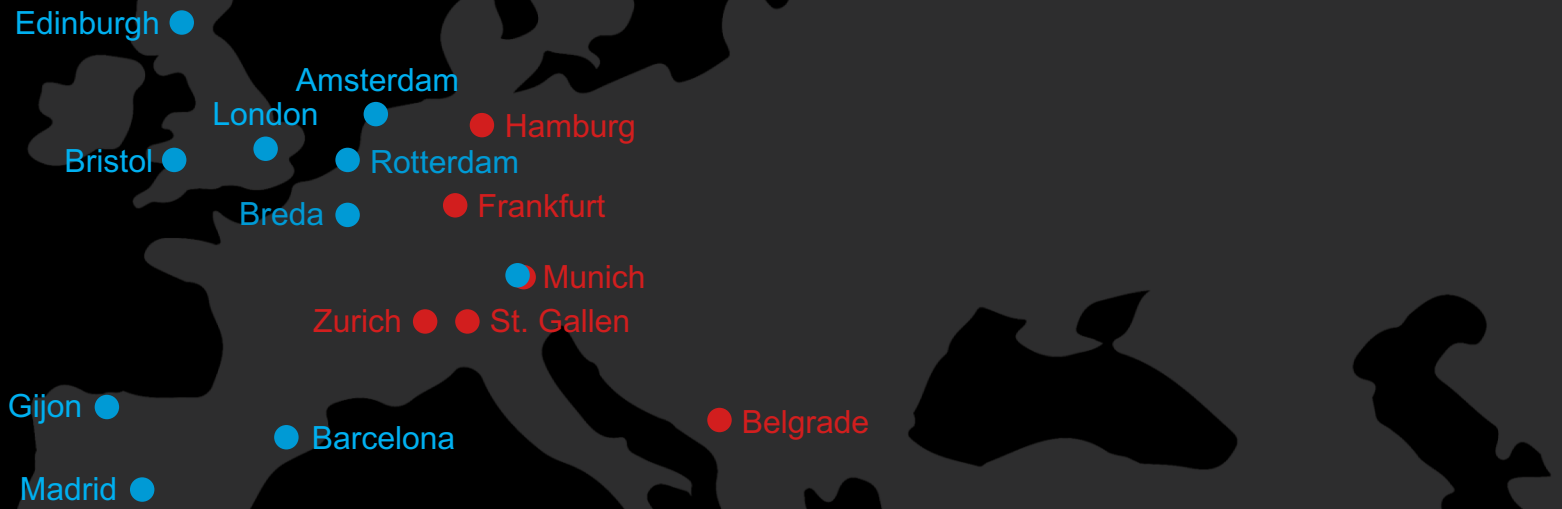
Adobe, Pega, IBM, salesforce, TEALIUM, Google

World Class Clients

adidas, vodafone, Unilever, ESTÉE LAUDER COMPANIES, DAZN, sky, HEINEKEN, Boehringer Ingelheim

Six locations. Three countries. Namics.

Two Partners. Even more possibilities.



Two Partners. Worldwide possibilities.

EMEA: London, Amsterdam, Barcelona, Breda (Ned.), Bristol (UK), Dubai, Edinburgh, Gijon (Esp.), Madrid, Munich, Rotterdam
North America: Columbia (MD), Atlanta, Austin (TX), Boston, Charlottesville (VA), Chicago, Denver, Hagerstown (MD), Little Rock, Los Angeles, Minneapolis, Montvale (NJ), New York City, Philadelphia, Pittsburgh, San Francisco, Seattle, Salt Lake City
Asia Pacific: Singapore, Bangalore, India, Beijing, Nanjing, Pune (India), Shanghai, Sydney

SECOND

Methods and Tools of Digital Transformation Projects.

Fast-paced Change in Business Requirements.

- Digital business has some particularly challenging implications. For example:
  - Outside-in view: Business requirements dictated by customer expectations, competitors, technical possibilities.
  - Time-to-market.
- Time of relaunches is over (for quite a while).
  - Base systems are introduced and sustainable.
  - Continuous improvement of interfaces, processes, …
  - Instead: Deploy, Measure, Improve.
- New business: start small, think big.

Start small, think big. Don’t worry about too many things at once. Take a handful of simple things to begin with, and then progress to more complex ones. Think about not just tomorrow, but the future. Put a ding in the universe.

Steve Jobs

Digital transformation projects exhibit properties that call for certain methods.

- Agile values, embrace change, fail early.
  - Deploy: Use what you have, test it constantly.
  - Measure: Do not work with assumptions, but data.
  - Improve: Use working solution as a base to iterate.
- Enablement through tools. Examples:
  - Continuous integration / continuous delivery.
  - Test automation.
  - Data collection.
  - Sometimes also: Cloud computing, service orchestration, etc.

Manifesto for Agile Software Development.

We are uncovering better ways of developing
software by doing it and helping others do it.
Through this work we have come to value:

Individuals and interactions over processes and tools
Working software over comprehensive documentation
Customer collaboration over contract negotiation
Responding to change over following a plan

That is, while there is value in the items on
the right, we value the items on the left more.

Example: Content Modeling.

- Need for evolution of both concepts and content.
  - Concepts are more long-lived than implementations.
  - Reusable content is more long-lived than representations.
  - Effort to migrate content to new presentations, supplemented business models, …
  - Etc.
- Independent evolution of …
  - Content,
  - Layout, ...

THIRD

Minimalistic Meta Modeling Language (M3L).

Overview over the Minimalistic Meta Modeling Language (M3L).

- Ongoing work on the Minimalistic Meta Modeling Language (M3L).
- Originally designed for SW engineering purposes, model-driven development (MDD) in particular.
- Shows properties suitable for content modeling.
  - Object-oriented properties, but abstraction from object-oriented principles.
  - Variants and contexts as the primary idioms.
  - Separation of concerns, separating models of different domains / abstraction levels.
- Due to its nature, it seems likewise suitable for other application classes.

M3L at Quick Glance.

Basic M3L constructs:

NewConcept. ← **introduce** new concept **or reference** existing one

NewConcept is an **ExistingConcept.** ← declare a concept a **refinement** of another

NewConcept is an **AnotherExistingConcept.**

TheOnlySubConcept is the **SingletonConcept.** ← define **exclusive refinement**

SomeContext { **ConceptInContext.** } ← **content** in **context**; **hierarchical definition** or **projection**

Movie { **Hitchcock** is the **Director.** } |= **Hitchcockmovie.** ← **semantic rule**

Person { **Name** is a **String.** } |- § "<person>"**Name** § "</person>".

↖ **syntactic rule**

A Small Example.

A small example show persons in different roles / contexts.

```
String. Number.

Person { Name is a String. }
Peter is a Person { "Peter Smith" is the Name. }

Employee { Salary is a Number. }
Programmer is an Employee;

PeterTheEmployee is a Peter, a Programmer { 30000 is the Salary. }
PeterTheMusician is a Peter, a Musician { Bass is an Instrument. }
```

Visibility. Inheritance.

Concepts defined in concept are visible inside their content.
`String` is visible in `Person` because it is defined in the context of `Person`.
`Salary` is newly defined in `Employee`.

Content, semantic rules, and syntactic rules of a concept are inherited by refinements.
The `Name` in `Peter` is the `Name` of `Person` (inherited by `Peter`).

Both visible and inherited concepts can be redefined, though.

M3L Evaluation.

M3L concepts are evaluated by a chain of …

Narrowing: Push down refinement hierarchy as far as possible. A concept *c* that has the same base concepts as a concept *b*, and has equal content, is narrowing of *b*.
`Peter` can be narrowed to { `PeterTheEmployee`, `PeterTheMusician` }.

Production: Apply semantic rules.
E.g., with `Musician { Bass is an Instrument; } |= "Bass Player"`
A concepts without a semantic rule evaluates to itself.

Evaluation: The alternating combination of narrowing and production.
Above production rule deduces that `Peter` (also) evaluates to `"Bass Player"` .

Knowledge Discovery Through M3L Evaluation.

By applying concept evaluation, some form of reasoning about models is performed.

```
Person { Sex. Status. }
MarriedFemalePerson is a Person {
  Female is the Sex. Married is the Status.
} |= Wife.
MarriedMalePerson is a Person {
  Male is the Sex. Married is the Status.
} |= Husband.
MalePeter is a Peter. { Male is the Sex. }
MarriedPeter is a Peter { Married is the Status. }
MarriedMalePeter is a MalePeter, a MarriedPeter.
```

Further define `Person` from above.

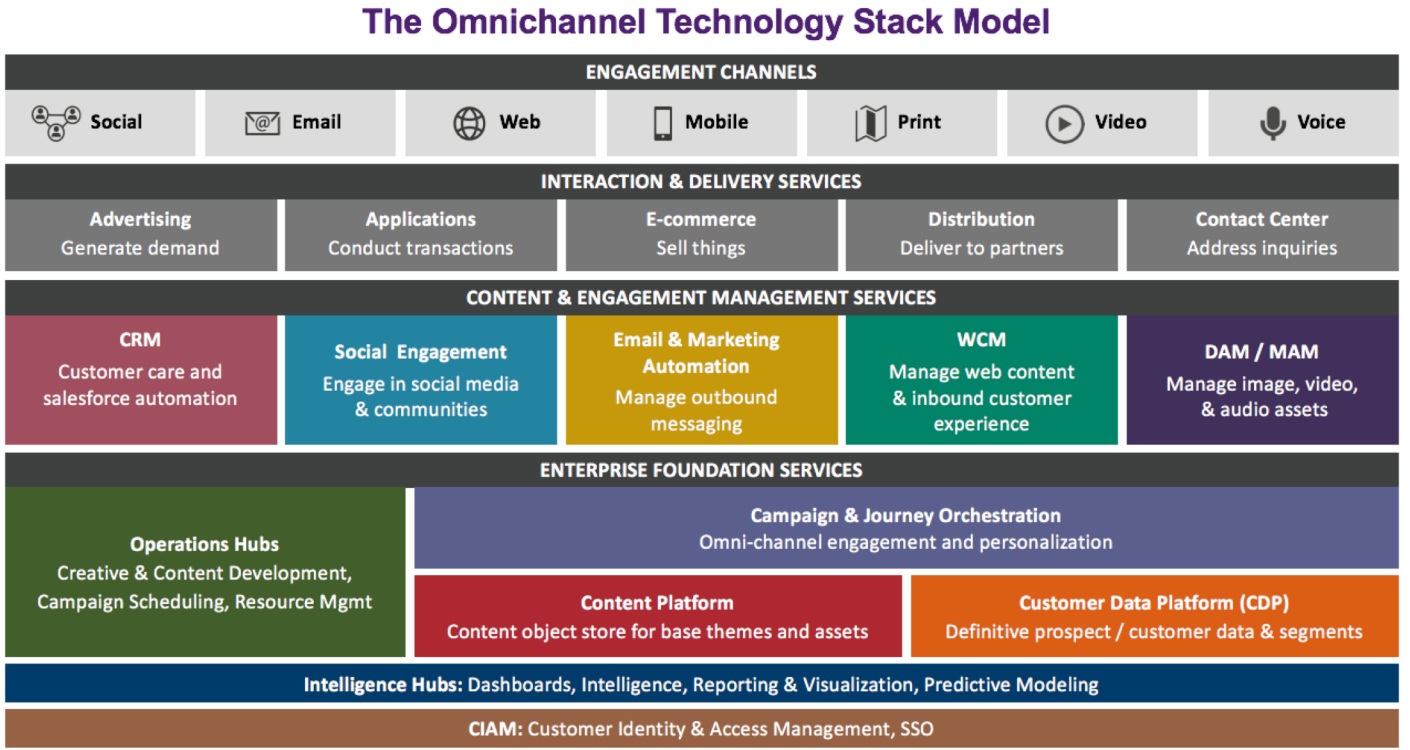
Peter evaluates to {**Husband**}.

```
now evaluate [MarriedMalePeter] in []
refinement tree: [MarriedMalePeter]
narrowing: [MalePeter, MarriedMalePerson,
MarriedPeter, MarriedMalePeter, Peter, Person]
evaluation: [Husband]
```

FOURTH

Digital Transformation Components.

Reference Architecture. Analysts Point of View.



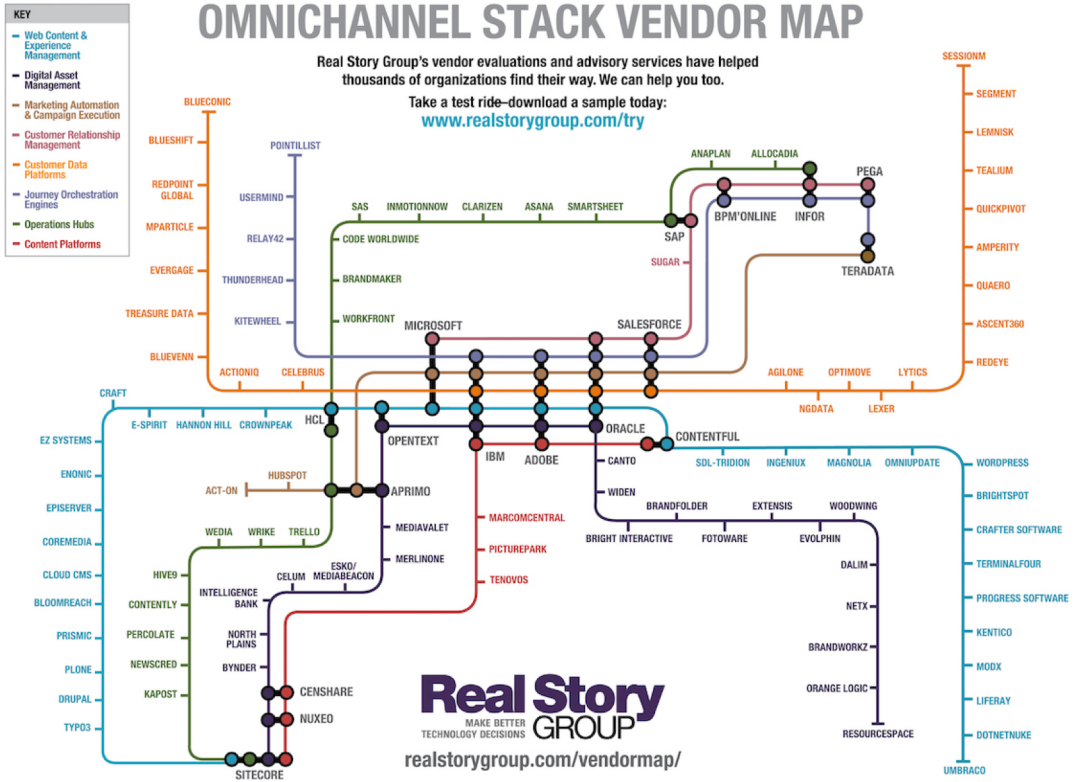
[Tony Byrne: *The New Omnichannel Stack*, https://www.linkedin.com/pulse/new-omnichannel-stack-tony-byrne/]

RSG Product Map.

For every component of that architecture proposal, there is a whole class of systems filling that role.

The RSG directly names quite some.

But:
With these many specialized subsystems come many integration tasks.



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

Or, More Complete: the “Supergraphic”.

[Scott Brinker: *Marketing Technology Landscape Supergraphic (2019): Martech 5000 (actually 7,040)*, https://chiefmartec.com/2019/04/marketing-technology-landscape-supergraphic-2019/]

Digital Transformation Components in M3L.

- Instead of commercial products, we remodel components in the M3L.
- This allows us comparing the system classes on an equal base.
- Systems integration can be studied without the need to take technical details that are of no conceptual relevance into account.
- Further – beyond the scope of this presentation – we can make system evolution approaches explicit.

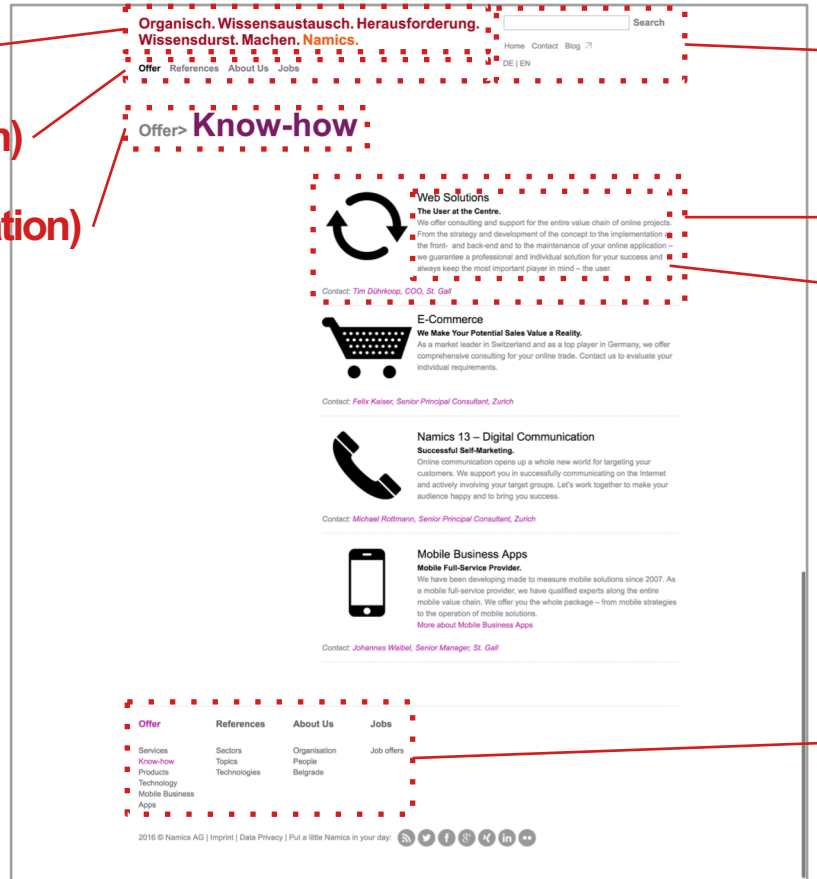
DIGITAL TRANSFORMATION COMPONENTS.

Content Management System.

Content Management System.

- Web pages, personalized or not, are created by a Content Management System (CMS).
- Such a system has several duties, typically:
  - Content is data representing information to be published. It is often created and managed according to a content model.
  - Integration of tools for collaborative content editing.
  - Quality assurance by approval of content changes.
  - Publication of content by creating documents (e.g., web pages), of by filling content into document templates.
  - Efficient delivery of the rendered documents, e.g., over HTTP.

Typical Web Page Layout.



Logo

Menu = top(Navigation)

Breadcrumb = path(Navigation)

Functions and Links

Teaser

short(Article)

Sitemap = deep(Navigation)

Plus possible parameters available to editors: depth of navigation, alternative texts for breadcrumb, …

Considerations for Content Models.

- **Content management based on a content model that defines the structure of the content.**
- **Content model:**
  - **Designed for different recipients.**
  - **Designed for competing requirements.**
  - **Covering different (conflicting) aspects of content management:**
    - long-lived content, reflecting domain model.
    - reusable content, for different channels.
    - variants of content, e.g., for campaigns and targeting.

Further Related Models.

- **Navigation model**
  - **used to structure a publication (e.g., a website) and**
  - **to produce a navigation (navigation menu, table of contents), section headings, breadcrumbs, …**
- **Content variants and relationships between them [S14], e.g., localizations [S17] or personalizations.**
- **Layout (of publications, but also the editor tool) is typically created by custom development. Declarative layout descriptions exist, though [S09].**
- **Content is published on different channels.**

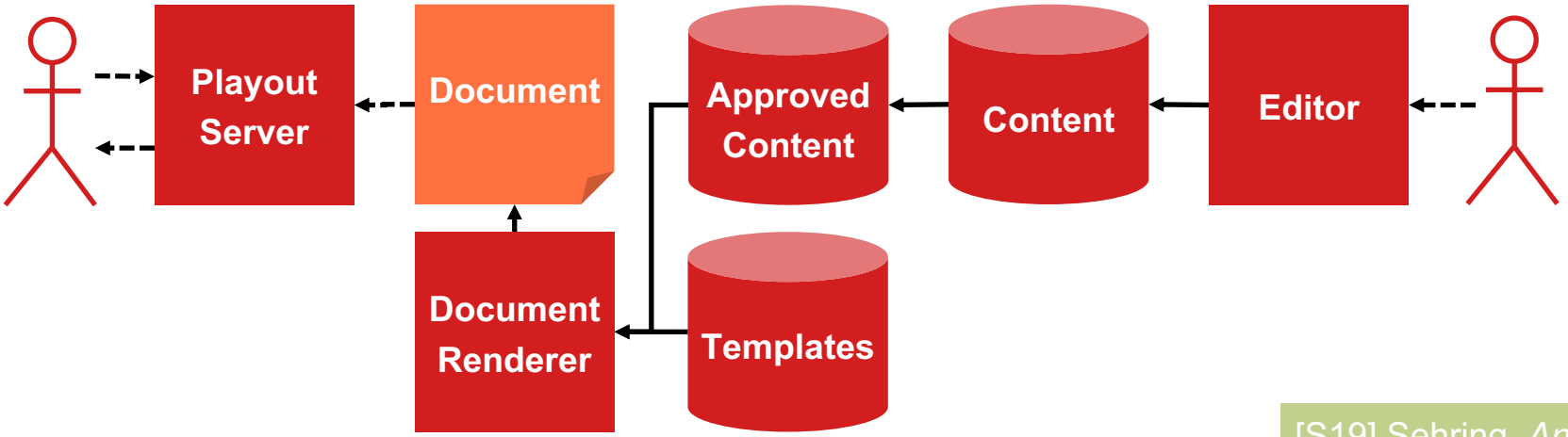
[S14] Sehring: A Modular Microservice Architecture for Multi-everything Content Management, Keynote Speech, Computation World 2014.

[S17] Sehring, *Content Structures, Organization, and Processes for Localized Content Management*, 2017.

[S09] Sehring: Adaptive Content Visualization in Concept-oriented Content Management Systems, 2009.

Content Management System Architecture.

– **A typical CMS setup:**



– **Omitted here, but often to be found: Tracking to measure content use [S19], Content Delivery Networks (CDNs) for fast delivery.**

[S19] Sehring, *An Integrated Model for Content Management, Presentation, and Targeting*, 2019.

Content Management in M3L.

A CMS defined by some base concepts.

```
ContentRepository. Content.
```

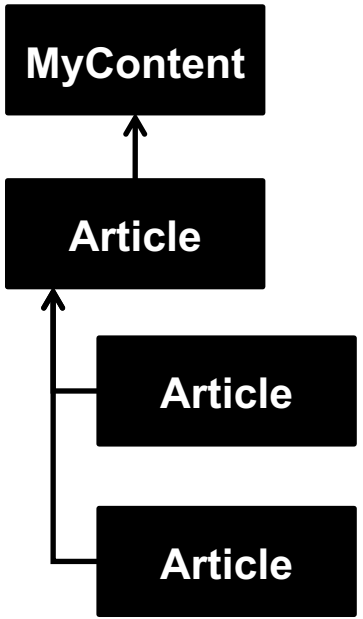
On the basis of such base concepts, a site-specific content model and concrete content is defined.

```
MyContent is a ContentRepository {
 Article is a Content {
  Title is a String.
  Text is a String. }
 Article4711 is an Article { … }
}
```

content model: specific type

content model: structure

content : a specific instance



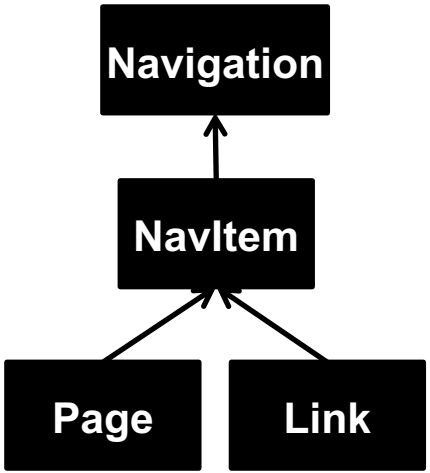
Navigation Model in M3L.

Navigation is best separated from content in order to maximize the potential of content reuse. In certain scenarios, though, content might depend on its (navigational) context.

As a simple example, we just introduce (web) pages as navigational entities and links from content nodes to an other content node.

Additional concepts constitute the base for the navigation model.

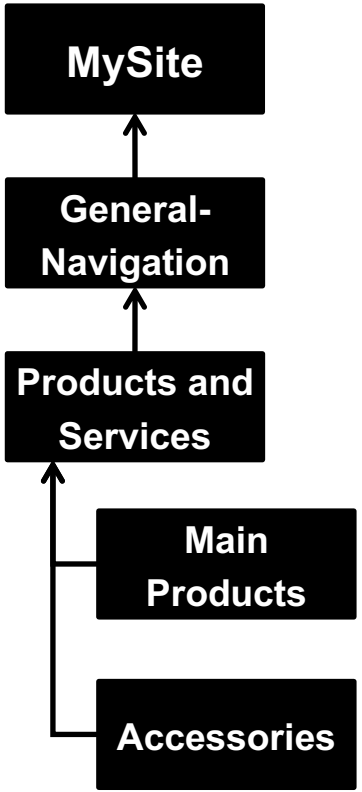
```
Navigation.
NavItem.
Page is a NavItem { Content. }
Link is a NavItem { Target is a Content. }
```



Navigation Structure in M3L.

The navigation structure is defined accordingly.
Contexts allow having multiple navigation structures.

```
MySite {
 ArticlePage4711 is a Page {
  MyContent { Article4711. } is the Content. }
 GeneralNavigation is a Navigation {
  "Products and Services" is a NavItem {
   "Main Products" is a Page { ArticlePage4711. }
   "Accessories" is a Page { … } } } }
```



Document Rendering in M3L.

Document layouts (templates) are defined by syntactic rules.

To allow different output channels, the rules are defined in a context per channel.

```
MySite {
 Page |- … § "<html>" … Content … § "</html>".
 Article |- § "<h1>" Title § "</h1>" Text.
}
MyMicroSite { … }
```

a channel

a second channel

A Web Page Put Together in M3L.

reusable content

```
MyContent {
  Keynote2019 is an Article {
    "Solution Landscape" is the Title.
    "In this talk I will present you…"
      is the Text.
} }
```

channel-specific structure and layout

```
MySite {
  Keynote2019Page is a Page {
    MyContent { Keynote2019. }
      is the Content.
} }
```

```
<html>
 <head>
  <title>Solution Landscape</title>
 </head>
 <body>
 <div>
  <h1>Solution Landscape</h1>
  In this talk I will present you…
 </div>
 </body>
</html>
```

DIGITAL TRANSFORMATION COMPONENTS.

Digital Asset Management System.

Digital Asset Management.

- A Digital Asset Management System (DAM) is similar to a CMS, but with a different focus.
  - Primary content is unstructured (binary data).
  - Content is not created inside the DAM, but managed by it.
- A piece of content in a DAM is called a digital asset.
- Sometimes distinguished: Multimedia Asset Management System (MAM).
  - DAMs that are specialized in certain media.
  - Media-specific operations, QoS-based playout, …

DAM Integration.

- In practice, a DAM is a separate component.
- Dependencies:
  - Assets are referred to by content (e.g., illustrations) and product data (e.g., product images).
  - Their lifecycle is independent from that of their referrers, but they need to be managed in a consistent way.
- Therefore, DAM integration needs to particular attention.
- DAM integration has to be considered in an application-specific way [S16].

[S16] Hans-Werner Sehring: *On the Integration of Lifecycles and Processes for the Management of Structured and Unstructured Content: A Practical Perspective on Content Management Systems Integration Architecture*, 2016.

DAM Content.

- **An asset has twofold content: binary data (for images, sound, video, …) and structured data for its management [ScSe03].**
  - **Description data: scene, motives, … Used to find assets based on description.**
  - **Metadata: image size, sound quality, … Used to describe binary data, to select assets suitable for certain channels, …**
  - **Legal data: licenses, usage fees, expiration dates, … Required to inform users about licensed use of asset, eventually used in automated processes**

[ScSe03] Schmidt and Sehring: *Conceptual Content Modeling and Management*, 2003.

DAM in M3L.

- For a DAM, we use M3L concepts that contain both binary data and related structured data.
  - The content of an asset concept is used for structured data.
  - We use syntactic rules of asset concepts for unstructured data. In contrast to the CMS case, the syntactic form is not an external representation, but the main content itself.
- Sketch of such a model:

```
Image is an Asset {
  ColorDepth is a Number |- §ext(§"imagetool", §file(FileName)).
  FileName is a String.
} |- §file(FileName).
Picture0815 is an Image { "img0815.png" is the FileName. }
```

DIGITAL TRANSFORMATION COMPONENTS.

Product Information Management System.

Product Information Management Systems.

- **Product Information Management Systems host product data: facts about products being traded, engineered, maintained, …**
- **They are used for different purposes, e.g.:**
  - **For Product Information Management (PIM).**
    - Catalogs.
    - Procurement processes.
  - **For Product Lifecycle Management (PLM).**
    - Engineering.
    - E2E processes.

Product Information Data.

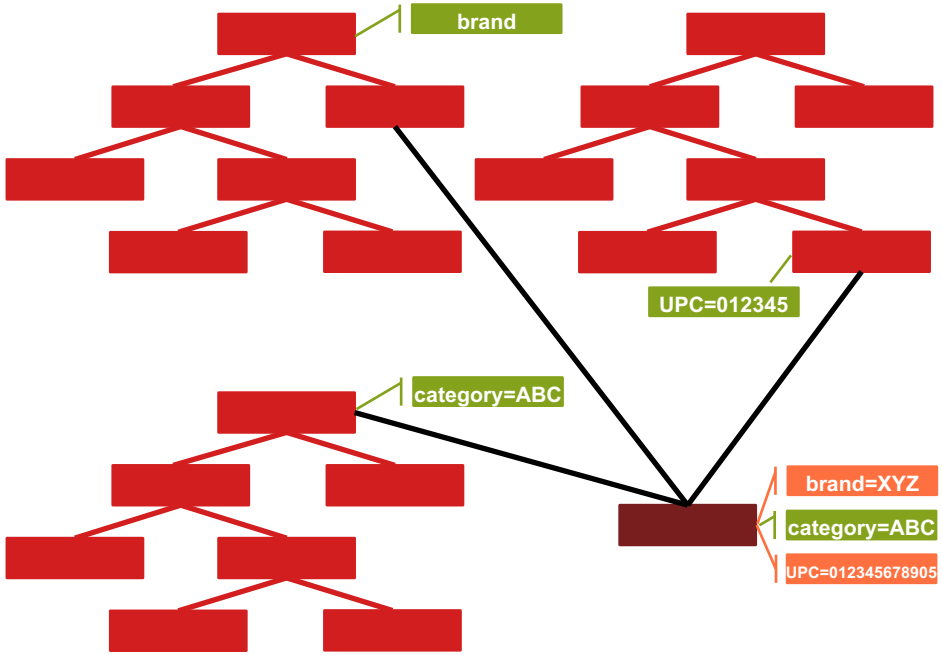
PIM systems typically manage product data in a hierarchical fashion.

Nodes on each level of the hierarchy can have aspects of a (semantic) category, a (structural) type, and structured data.

Like a type definition, nodes can have attributes assigned.

As data, the attributes can have values assigned.

Attributes, including values, are ”inherited” by nodes along the hierarchy.



Product Information Management Expressed in the M3L.

In M3L, we can use context to both express hierarchies and attribute assignments.

Predefined base concepts are used to distinguish between categories and attributes (e.g., refining hierarchy nodes from a **`Category`**).

Attributes may be structured, e.g., into value, unit of measurement, format, precision, …

For example, base concepts:

```
Catalog. Category.
```

Concrete PIM content:

```
ProductFamily is a Category.
Product is a Category.
Article is a Category.
Manufacturer. UPC.
MyCatalog is a Catalog {
 Photo is an Image
 |- DAM { Asset { ID is the UPC. } }
 Electronics is a Category {
  "TV and Video" is a Category {
   "TV Sets" is a Category {
    VX_389_ABC is a ProductFamily {
     "Shnupizo" is the Manufacturer.
     VX_389_ABC_00 is a Product {
      VX_389_ABC_00_b is an Article {
       012345678905 is the UPC.
}}}}}}}
```

DAM integration comparable to [S16]

Product Information Data Exchange.

- PIMs are typically the place where (product) data exchange is managed.
- In particular, e.g.:
  - Data import from suppliers. This may include different data exchange formats, and it has to address regular updates.
  - Data export to client-facing components that need (product) data. This typically includes a wide range of components (CMS, commerce platform, Apps, …).

Product Information Exchange Expressed in the M3L.

- Assume and products and article like
  ```
  Article { ID. Name. Size. }
  ```
- Different exchange formats are handled by syntactic rules that are defined in different contexts, like:
  - Import with for a supplier with import format Format1.
    ```
    Import { Format 1 {
     Article { ID is the UPC. } |- … UPC… Name… Size.
    }}
    ```
  - Export for two receiving components (channels):
    ```
    Export { Channel1 { Article |- … }
             Channel2 { Article |- … } }
    ```

DIGITAL TRANSFORMATION COMPONENTS.

Ecommerce Platform.

Ecommerce Platforms for Online Shops.

- Ecommerce platforms Share features with CMSs.
- On top of that, they manage commercial data on top of content:
  - Product data: product description in (or from) PIM or ERP (and DAM), prices, stocks.
  - Transactional data: shopping basket, orders, payments.
- … and drive additional processes.
  - Integration with fulfilment: payment, ordering, shipping.
  - Integration with backend systems like ERP and CRM.

Ecommerce Data in M3L.

- **The data handled by an ecommerce platform can by modeled in the M3L in a straight-forward way.**
- **Sketch:**

```
Product. Article is a Product.
Basket {
  Items. Article { Quantity is a Number. } is an Items.
  Customer is a User. }
PaymentMethod. CreditCard is a PaymentMethod.
Payment { Customer. Date. }.
CreditCardPayment is a Payment { CreditCard. }
Order { Customer. Basket. Payment. }
…
```

Business Rules and Transactions in M3L.

- Transactions require more attention. The business logic is, partially, application specific.
- Therefore it is beneficial to model it in the M3L. But business rules and transactions tend become lengthy in M3L.
- Example:

```
Basket {
  QuantityConstrainedArticle is an Article {
    Quantity is a Number.
    ToLowQuantity is a Quantity, a NegativeNumber |= 0.
    ToHighQuantity is a Quantity, a 101 |= 100. }
  Items. QuantityConstrainedArticle is an Item.
  Customer is a User. }
```

DIGITAL TRANSFORMATION COMPONENTS.

Customer Data Platform.

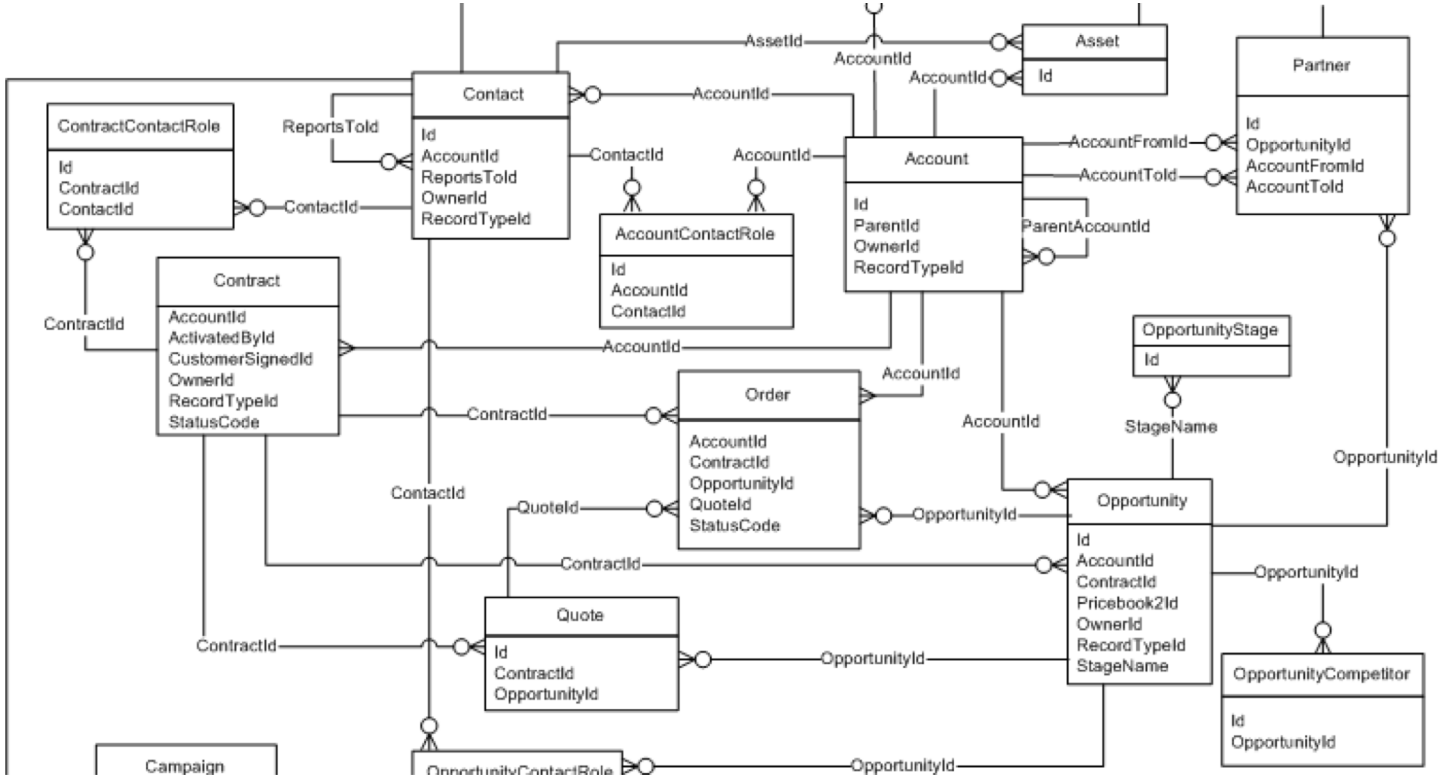
Customer Data.

- Many activities in digital business are based on a deep understanding of customers and prospects.
  - A Customer Data Platform (CDP) records activities of customers and prospects on all channels. It is directed at marketing and at client-facing components.
  - A Customer Relationship Management (CRM) System collects data on all business processes and transactions that involve customers and prospects, like marketing, sales, and support.
- Therefore, CDPs interact with components that
  - provide data about customer interactions and that
  - utilize data to better provide their service to customers.

Customer Data Utilization.

- Customer Data is for analyzing the whole data base.
- Creating various business reports to guide management, marketing, sales, …
  → Not covered here.
- Customer segmentation to determine customer interests by means of clustering.
  → See: Sehring, *An Integrated Model for Content Management, Presentation, and Targeting*, CONTENT 2019, Venice, Italy. Presented Wednesday.

SalesForce Meta Model (extract).



[https://developer.salesforce.com/docs/atlas.en-us.api.meta/api/sforce_api_erd_majors.htm]

CRM in M3L.

- **A CRM is very much data-centric. Models are exhaustive, but straight-forward.**
- **Sketch:**

```
Appointment { Date. Location. Type. }
Contact { Name is a String. History. Appointment is a History. }
Manager is a Role. Decider is a Role.
Project {
  Title is a String. ProjectRole is a Role.
  ProjectManager is a ProjectRole, a Manager.
  Decider is a ProjectRole. }
Project789 {
  "..." is the Title.
  Contact123 is the ProjectManager. Contact456 is the Decider. }
```

DIGITAL TRANSFORMATION COMPONENTS.

Customer Journey Orchestration.

Customer Journey Maps.

- To optimize a website, it is common practice to analyze customer journeys, the communication paths of a user before a conversion takes place.
- Based on the result, the website is improved, e.g.,
  - navigation paths are optimized for customer journeys,
  - conversion blockers are resolved, or
  - customer information is used to personalize based on previous user interactions.
- It is the customer that drives the process, not a workflow engine or similar.

Customer Journey Challenges.

- The analysis requires omnichannel consideration: customers are used to choosing different communication channels depending on their current needs.
- Optimizations …
  - are applied after certain shortcomings of the current way in that customers are approached have been identified, and they
  - are applied for all customers in the same way.

Customer Journey Orchestration.

- This is now starting to be automated. Journey Orchestration Engines are a potential new class of systems that allow
  - continuous optimization in realtime.
  - optimization per user (personalized).
- Such engines learn from ongoing customer journeys in order to
  - give deeper insights into customer journeys,
  - to take all channels into account, and to
  - predict “next best actions” on a customer journey.

FIFTH

A Unified Model (and Implementation?) of the Digital Transformation Landscape.

Systems for the Digitally Transformed Business.

- An overall digital platform consists of an application-specific assembly of the abovementioned components.
- In a typical digital transformation project, the implementation work consists of:
  - The choice of those components that contribute to the overall solution. Decision which kinds of components to add.
  - The choice of concrete products and services that deliver the required functionality to the best degree. Decision for which component to use a high-end, a midrange or a low-end product or service.

The Right Mix of Components for a Specific Solution.

Those functionalities that are required in a solution are required to different degrees. Hypothetical examples:

Marketing-oriented website:

⇒ high-end CMS, high-end DAM, capable PIM, simple commerce plattform, …

Sales-oriented website:

⇒ mid-range CMS, medium DAM, high-end PIM, high-end commerce plattform, …

Definition of Digital Components in the M3L.

- As seen for the digital transformation components: these can by and large be modeled using the M3L.
- M3L can be a useful framework for:
  - The discussion of the components' properties, commonalities, and differences.
  - An abstraction from technical details.
- If used as an implementation:
  - As solution for integration tasks.
  - As a solution to the gradual introduction of systems.
- Work. In progress.

Integration of Various Components of a Hypothetical Digital Platform.

```
MySite {
 Page4711 {
  DAM { Image { 12345 is the ImageID.
                Left is the Position. } } is a Picture.
  "Welcome to the Page" is the Title.
  "On this page you find information" {
    Center is the Position } is a Text.
  Shop { Basket { Session { User. } is the Customer. } }
  Tracking { Visit { Session { User. } is the Visitor.
                     Page4711 is the ViewedPage. } }
} }
```

DAM integration

Shop integration

Tracking integration

SIXTH

Conclusion.

Conclusion 1/3.

- The digital transformation of high importance for business and the whole society.
- The drivers of digital businesses are the expectations of customers and the demand of markets.
- The enabler is technology.

Conclusion 2/3.

- Digital process implementations incorporate a whole range of products and services, as well as custom development.
- New solutions constantly emerge, with varying focus and with overlapping contributions.
- New methods and technologies are eagerly adopted by the digital economy.
- Yet, science does not consider these with the due interest.

Conclusion 3/3.

- It needs a systematic analysis and study of the digital transformation landscapes in order to study
  - methods, principles,
  - architectures, system integration,
  - implementation approaches,
  - …
- Proposal here:
  - formalize components and functionalities on an equal ground
  - in order to be able to reason about (classes of) solutions.

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Thank you. Namics.

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