

## Software for web services & system integration

Software engineering, IT design & IT development for IoT & IIoT

*bintellix<sup>®</sup> Software engineering & design helps companies to get the complexity of modular systems & software under control and to offer adaptable products faster.*

*Martin Richter CIO von INTERSECURITY*

## Recognize potential and exploit it sensibly

We transform your ideas & processes into **scalable success** with the use of **smart software & intelligent systems**.

And thus ensure **resource-efficient & perfected processes** in your company that **secure long-term competitive advantages**.

bintellix<sup>®</sup> Munich is the specialist for IT development, software design, system integration & API development based on IoT and IIoT technologies.

Our approach - your advantages:

- **transparent technical consulting**

Personal and individual advice - **independent from technologies and manufacturers**



## ■ **clear added value with IoT solutions**

intelligent & **future-proof systems** for **perfected processes**, innovative products & **excellent quality**

## ■ **agile software development**

State-of-the-art technologies & applications for optimized services, productivity & revolutionary corporate success

## The best key technologies

### for your business agility and innovative strength

The key to **continuous company growth** lies in **innovative** software development & agile, **fully automated** processes.

This is the only way to guarantee **highly flexible business agility** that is not driven by the dynamics of digital change, but **dominates it**.

This is, how we turn **future-oriented ideas into concrete and profitable success** for your company.

### for your IT landscape

## bintellix<sup>®</sup> – Software solutions & system integration from a single source

Our **experts in the field of the Internet of Things** offer you a **wide range of services** related to the **integration** of high-performance systems & intelligent devices as well as the development of **API-based applications**.

That is why bintellix<sup>®</sup> consistently **focuses** on **eBusiness solutions and application, software development and design**. Based on **adaptive API technologies, modular service architectures and reliable IoT technologies**.

We focus on 3 areas:

- Software engineering based on **Service-Integration & RESTful API technologies**
- Design, development & test of modular **back-end architectures**
- highest application- and IT-security

We design web and middle-tier systems **based on Java, C and C++** as well as the best standards and frameworks for **modular networking**.

*Become different:  
with decentralized intelligence & smart clusters*

## RESTful APIs

### Agile interface management

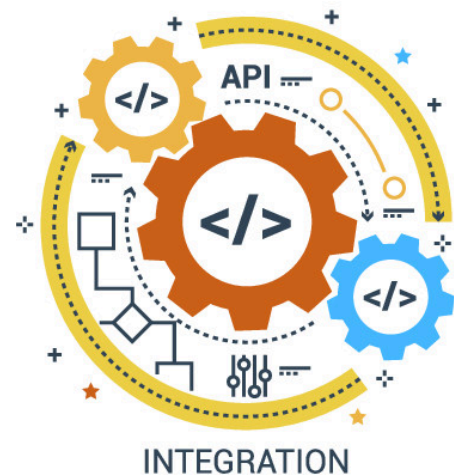
Benefit from **agile, maintainable & adaptable Processes** across all business and production levels.

Use the concentrated power of API interfaces for dynamic workflows, flexible functions, online customer connection, for direct internet sales. Market your services to external customers. Or simply benefit from the lightness and transparency of API gateways and service modules.

### Your added value:

- modular and **replacable**
- compact and **integrable**
- maximally **standardized**
- **independently** maintainable
- highly **scalable**
- fully automated **testable**

More than digitally networked



## Web service & microservices

future-oriented & strong performance

We offer a **wide range of services** for the conception, construction and expansion of **web services**.

The focus is on **service architectures** and systems, in Java.

Your benefit: **slim, design-strong & data-safe** communication **solutions**. In addition, complete **integration tests** that even critical systems can run non-invasively.

As a result for your company:

- **real agility**
- complete **Maintainability**
- reliable **IT security**
- future-proof **adaptivity**
- vertical & horizontal **Scalability**

Everything from a single source: analysis, design, development, test and support

## Professional system integration & refactoring

**slim, safe, scalable**

**Expand your corporate successes** many times over - with a broad network of intelligent systems, processes & functions.

Our Smart Cluster experts **clean up** the digital structures in your company **from unnecessary load & complicated architectures** with the help of **highly flexible** integration **layers**. As well as software- & hardware adapter.

**Your advantages at a glance:**

- 100 % **data protection** & system performance
- controllable & highly efficient processes
- **resource-saving**, optimized processes

- minimal risk & reduced time-to-market

## Smart devices & IIoT controller

### innovative & resource efficient

Future-proof IoT & IIoT technologies generate **invaluable added value** with long-term & **strong competitive advantages**.

As long as you use and use the **right technologies** in your company.

This is exactly what we ensure - with the help of **adaptive & variable interfaces, high-quality standards, embedded software** modules & flexible controls.

Your profit:

- the highest level of **connectivity**
- manageable **digital infrastructures**
- powerful systems



The intelligent networking of IIoT infrastructures, devices & digital control systems is of particular importance here in order to draw profitable potential from the Internet of Things.

Instead of rigid, monolithic structures, we rely on **decentralized intelligence** through integrated micro services. Our professionals in the field of IoT system integration & development will give you comprehensive advice and advice on useful systems and functions and help you implement future-oriented technologies.

Flexible, independent & secure.

## bintellix<sup>®</sup> - software engineering, system development & service development

Acting **proactively instead of reactively** - that is the decisive difference between success and failure in a **dynamic market environment** that is characterized by **rapid changes**.

With the right technologies and **agile software development** you are able to do the digital Shaping **transformation as an enabler** instead of "only" accompanying it.

This is how our Smart Cluster experts transform future-oriented ideas **into concrete and profitable results**.

Flexible, adaptive & intelligent.

*Connected Intelligence  
lean & agile solutions for complex problems*

## Management experience

To successfully design a technical **project**, you need much more than IT skills.

**High-quality management skills** not only round off the profile of professional system integrators, they are a **key success factor** for achieving corporate goals.

### The five key indicators for efficient project management

Experience shows that successful projects are characterized by 5 points:

#### 1. Target definition

A **clear definition of the project goals** based on the SMART principle ensures scalability and transparency over the entire project duration.

#### 2. Communication

Regular, clear and **open communication with all relevant departments and experts** involved guarantees a reliable exchange of information. At best, misunderstandings are avoided and engagement is encouraged.

#### 3. Prioritization

Small, **manageable units**, intermediate steps and teams **reduce the complexity** of large projects, facilitate **decision-making** and lead to **quick** and tangible results.

## Professional competence

- **Strategic information system planning** :
    - Process consulting and optimization
      - *Cost savings through **intelligent IT implementation***
    - Implementation of strategic business concepts in corresponding IT concepts
  - **Requirements management**:
    - Requirements-Engineering
    - Implementation with risk management, change management, implementation management
  - **Software development** – *Software engineering*
  - Project management – *especially **technical project management***
  - **System architecture**
  - **Conception**, implementation and test of individual and branch software
  - Data management
  - Introduction and **integration** of software systems
- ### Methodical knowledge
- Project management methods
  - Process management and IT strategy
  - Development of integration strategies

## 4. Technology

**Clear technology** is a priority. The technologies used must be able to be **flexibly adapted** to new requirements and be **future-proof**.

## 5. Planning and control

**Detailed project planning** is necessary for **low-risk and resource-saving** project management. Information gaps, dependencies and sources of error are **immediately recognized and eliminated**.

Various studies show what happens when there is a lack of appropriate skills: at least half of the IT projects do not meet the right requirements, drag on, and eat up more costs than planned, or are canceled spontaneously.

## Project management and management

- Project planning and management – *Effort, deadlines, resources*
- Project structuring – *Project phases, milestones, work packages, employee assignment, etc.*
- **Technical project management** / team management
- Selection and **control of subcontractors** and service providers
- Creation of service and work contracts – *Pricing, warranty*
- Progress control and control regarding deadlines, resources and risks
- Monitoring and control of (possibly running in parallel) project groups
- Creation of regular reports on the project status
- Coordination of **internal and external developers** or suppliers
- **Quality assurance** of business and IT concepts
- Quality assurance of the created system components by **comparison with the requirements**
- Control and monitoring of the acceptance or handover

## Programming languages

**Choosing the right programming language** is a tricky task that requires a **great deal of knowledge** about various development methods, IT applications and systems.

Whether Java, C ++ or Python - it always depends on **what** you want to develop, **for**

### C und C++:

Programming of application systems und device drivers for Windows, Linux and Unix. As well for the embedded software development.

### C#:

Programming of **web service** based services.

**which system** to program for and what the whole thing **is good for**.

While web applications still like to be written in PHP, no modern user interface can be implemented without JavaScript.

Some tasks are again domain-specific: For example, R is best suited for the statistical evaluation of data, SQL for querying databases. C and C++ are the first choice in machine-level programming.

In addition, other **language-specific properties** must be taken into account in software engineering.

These include **execution speed**, **complexity**, code **quality**, **errorhandling** per runtime environment, IT **security** mechanism and **adaptability**.

## Java:

Programming of client and **server systems**.

## JavaScript / ECMAScript:

Programming of client based functionalities

## Python:

Adoption of **KI/DL** toolsets

## XQUery:

XML Query Language

## Software methodics

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## Requirements management

■ Fachliche Bedarfsermittlung

■ Requirement-Management

■ IT Konzept Erstellung

■ Lastenheft / Pflichtenheft Erstellung

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## Architecture principles

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## Architecture pattern

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■ Object-oriented drafting:

➤ OO analysis (**OOA**)

➤ OO design (**OOD**)

➤ OO programming (**OOP**)

■ Structural design – **UML design**, *use-case diagrams*

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■ ISO9000 - ISO9004 Quality management

■ Performance und capacity management

## Software standards

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## Hierarchical data structures

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## Webservices / REST APIs

■ [Hypertext Application Language \(HAL\)](#) – xxx

■ [Hypermedia as the Engine of Application State \(HATEOAS\)](#) – xxx

■ [Siren](#) – xxx

■ [OpenAPI \(formerly Swagger\)](#) – *REST API specification & publication standard*

■ Service Discovery:

➤ DNS Service Discovery (**DNS-SD**)

➤ Service Location Protocol (**SLP**)

➤ Universal Description Discovery and Integration (**UDDI**)

➤ Web Services Dynamic Discovery (**WS-Discovery**)

■ Simple Object Access Protocol (**SOAP**) – xxx

■ Service-Oriented Architecture Registry (SOA Registry)

:

■ Business Process Execution Language (**BPEL**)

■ Business Process Modeling Notation (**BPMN**)

■ XML Process Definition Language (**XPDL**)

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■ Enterprise Java Beans (**EJB**)

■ Java **Servlets**

■ Java Server Pages (**JSP**)

■ **.NET** Enterprise Services

■ **.NET Remoting**

## Data communication protocols and standards

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## Web standards

- HTML / XHTML
- Cascading Style Sheets (**CSS**)
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- XForms
- XPATH
- XQuery
- XSL / XSLT

## Datenkommunikation

- xxx – xxx
- xxx – xxx
- Web server protocols – xxx
- Email server protocols – xxx
- Remote shell protocols – xxx
- Telefonie – xxx

## File transfer and storage

- Amazon **S3** – *HTTP based file transfer and storage protocol*
- Server Message Block (**SMB**) – *>Microsoft File-Transfer und Authentication Protocol. Vormalis: Common Internet File System (**CIFS**)*
- Network File System (**NFS**) – *Unix network file system*
- Web Distributed Authoring and Versioning (**WebDAV**) – *>HTTP based file transfer and storage protocol*

## Internet Protocol

- IP protocol – *IP protocol **IPv4 und IPv6** (TCP, UDP, ICMP, MPTCP), IPsec, QOS/TOS, Neighbourhood Discovery*
- Dynamic Host Configuration Protocol (**DHCP**) – *for IPv4 and IPv6*
- Domain Name System (**DNS**) – *incl. Service Discovery*
- IP security – *IP routing (incl. NATing), IP firewall, VPN with **IPSec and WireGuard***

## Network Management

- Port-based network access control (IEEE 802.1x) – *Makes use of the physical access characteristics of IEEE 802 Local Area Networks (LAN) infrastructures in order to provide a means of authenticating and authorizing devices attached to a LAN port*
- Spanning Tree Protocol (**STP**) – *MSTP (IEEE 802.1s), RSTP (IEEE 802.1w), STP (IEEE 802.1d)*
- Virtual Local Area Network (**VLAN**) – *Ethernet VLAN tagging*

## Security technologies and standards

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## Data security

- **API Gateway / API Firewall** – *REST based application firewall*
- **BSI Richtlinien** – *IT Grundschutz Kompendium, Zertifizierung nach ISO 27001*
- Certification standards – *Kriterienkataloge: Orange Book, IT-Kriterien, ITSec-Kriterien, Common Criteria; Personal: CISM, CISSP*

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- Cryptography Standards:
  - Certificate Authority (**CA**)
  - Crypto-Module (Verschlüsselung)
  - elektronische Signatur
  - Public-Key Cryptography Standards (**PKCS12**) – z. B. für eToken
  - Public-Key Infrastructure (**PKI**)
  - **SmartCard** – incl. Crypto Engine
- Authentication / Authorization:
  - JSON Web Token (**JWT**) – open standard (RFC 7519) that defines a JSON object for secure access
  - **Kerberos** – Token
  - – LDAP like Domain Administration
  - **Open LDAP** – Open Source LDAP Benutzerverzeichnis
  - Simple and Protected GSSAPI Negotiation Mechanism (**SPNEGO**) – xxx
- Firewall:
  - diverse Hardware Firewalls
  - IP-Tables
  - Linux IP Filter
  - Sandbox Systeme
- **Honeypot**
- Network based Intrusion-Detection-System (NIDS)
- Host Based Intrusion-Detection-System (HIDS)
- Proxy – Security Policy Rules, Konfiguration unterschiedliche Proxy Server
- **Sandboy**
- Single-Sign-On (**SSO**) – diverse Systeme wie z. B. CA SiteMinder
- VPN – diverse open source VPN implementations

## Data protection

Datenschutz-Grundverordnung (**DSGVO**) /  
GDPR

## Consumer internet of things (CIoT) technology

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## Bus systems for building automation

■ [Constrained Application Protocol \(CoAP\)](#) – ein von der Internet Engineering Task Force (IETF) entwickeltes Web-Transfer-Protokoll mit parallelen zu REST

■ [DALI](#) – Lichtsteuerung

■ [KNX](#) sowie [KNX/IP](#) – xxx

■ Standard Motor Interface (SMI)

■ [M-Bus](#)

■ Zigbee – unter anderem Philips Hue und Zigbee Light Link (ZLL)

## Home automation software

■ [OpenHAB](#) – highly adaptable control, written in Java

■ [ioBroker](#) – flexible and modular application for the IoT and Smarthome written in Javascript

## Microcontroller / Prototypen hardware

■ [Arduino](#) – Uno, Leonardo, Nano Every

■ [Espressif Systems](#) – ESP32, ESP8266

■ [Raspberry PI](#) – Uno, Leonardo, Nano Every

## Industrial internet of things (IIoT) technology

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## Feldbus and messaging

■ CAN-Bus Adapter – xxx

■ Direct Number Control (DNC) – Ist keine Bus sondern ein serialer Adapter Standard

■ [Modbus](#) – de-facto industrial standard for serial communication

■ [MQTT](#) – machine-to-machine (M2M) connectivity protocol

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## Interexchange

- [Open Platform Communications United Architecture \(OPC UA\)](#) – xxx
- [universal machine technology interface \(umati\)](#) – xxx
- Reference Architecture Model for Industry 4.0 (RAMI 4.0) – / xxx

## Platform software

[Coaty](#) – *The lightweight open-source framework for Collaborative IoT*

## Agile software engineering & IT development for B2B, B2C and B2E

### Grow through innovation, convince with uniqueness

As a **full service agency** with a team of **savvy** software engineers, system integrators and experienced application developers, we **optimize sales, service and production processes** based on your needs.

So you can concentrate on your **core competencies** and customers while we develop your company **according to your ideas**.

### Further fields of application for connected intelligence:

#### Unternehmen

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