



Whiznium**SBE** And Whiznium**DBE** Code Generation Services For Embedded

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Whiznium Code Generation Services For Embedded IoT in 2018 | Product&Scope | Company | Audience&Marketing | Perspective

- Countless platforms for *simple* IoT applications, mostly about “pushing sensor data into the cloud”
- Affordable single-board computers and industrial gateways are readily available, offering unprecedented “edge computing” capabilities
- But: developers with embedded focus who implement *complex* projects in classical VHDL/C++ are faced with a fragmented market of development tools / libraries with limited scope, each requiring extensive training
- For them: IoT offers new opportunities but also poses new challenges (programmable logic, multi-threaded, connectivity options, ...)
- “Full-stack” for enterprise software development is commonplace
- No “full-stack” exists for today’s demand for sophisticated connected IoT devices

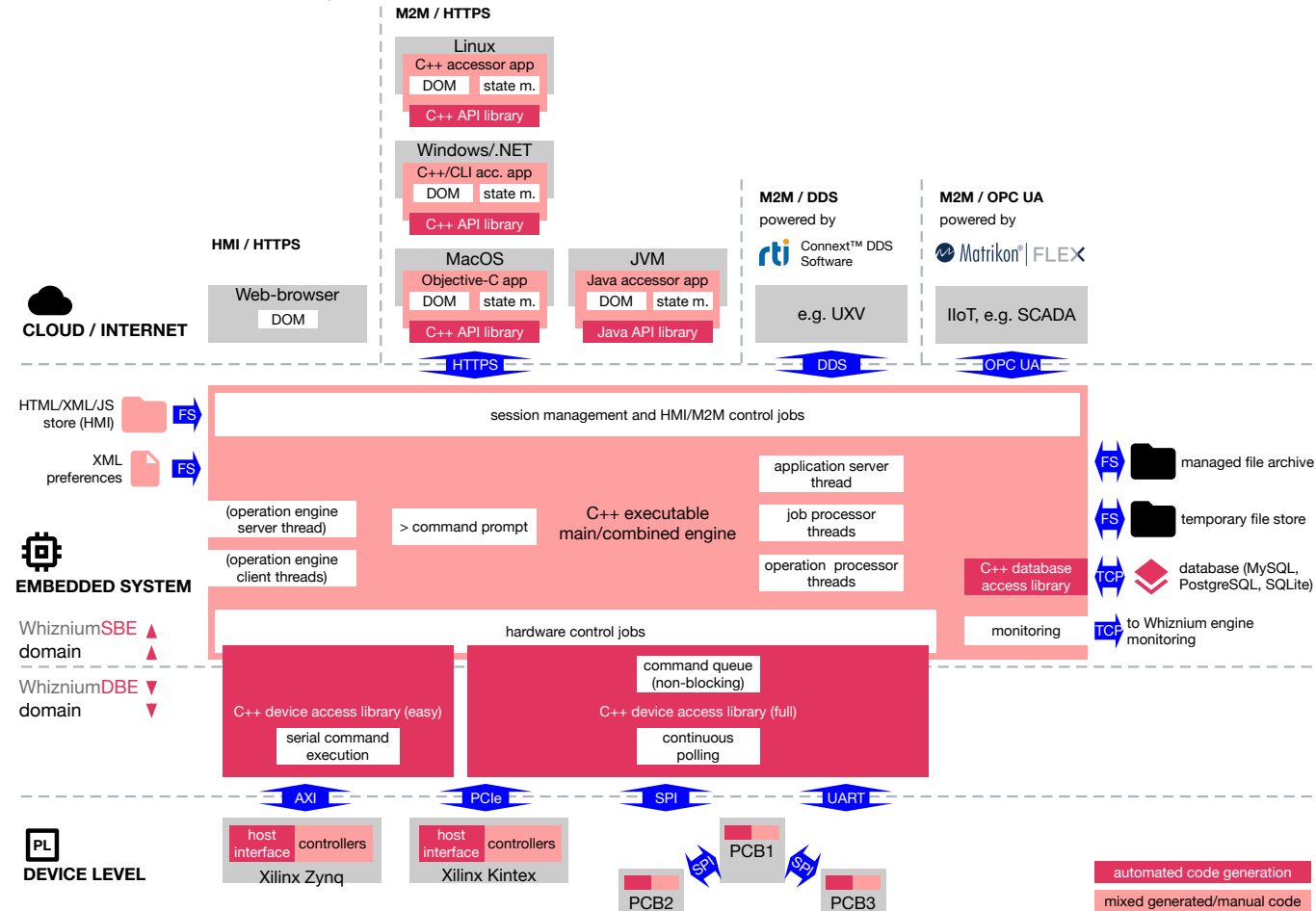
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- The answer to *complex* IoT development challenges: automated code generation, powered by MPSI's Whiznium
 - Frees precious development resources otherwise allocated to implementing non-core aspects of IoT projects
 - Enforces clean source code structure
 - Greatly enhances code maintainability across developer teams and across projects
- Whiznium generates and maintains a “full-stack” skeleton source code tree
 - FPGA modules for custom hardware control (VHDL), FPGA access library (C++)
 - Multi-threaded main executable (C++)
 - SQL database access library / wrapper (C++)
 - Embedded HTTPS server and web-based user interface (HTML/JS)
 - M2M API libraries for external device access (C++, C++/CLI for .NET, C++/Objective-C for MacOS, Java for JVM)
 - Embedded OPC UA server (optional), embedded DDS publisher (optional)
- Key differentiators
 - All code is in plain sight, no open- or closed-source libraries are involved in final product
 - Mixing of automatically generated code and manually written code is part of the concept
- Whiznium Device Builder's Edition (DBE) for everything FPGA, Whiznium Service Builder's Edition (SBE) for everything else

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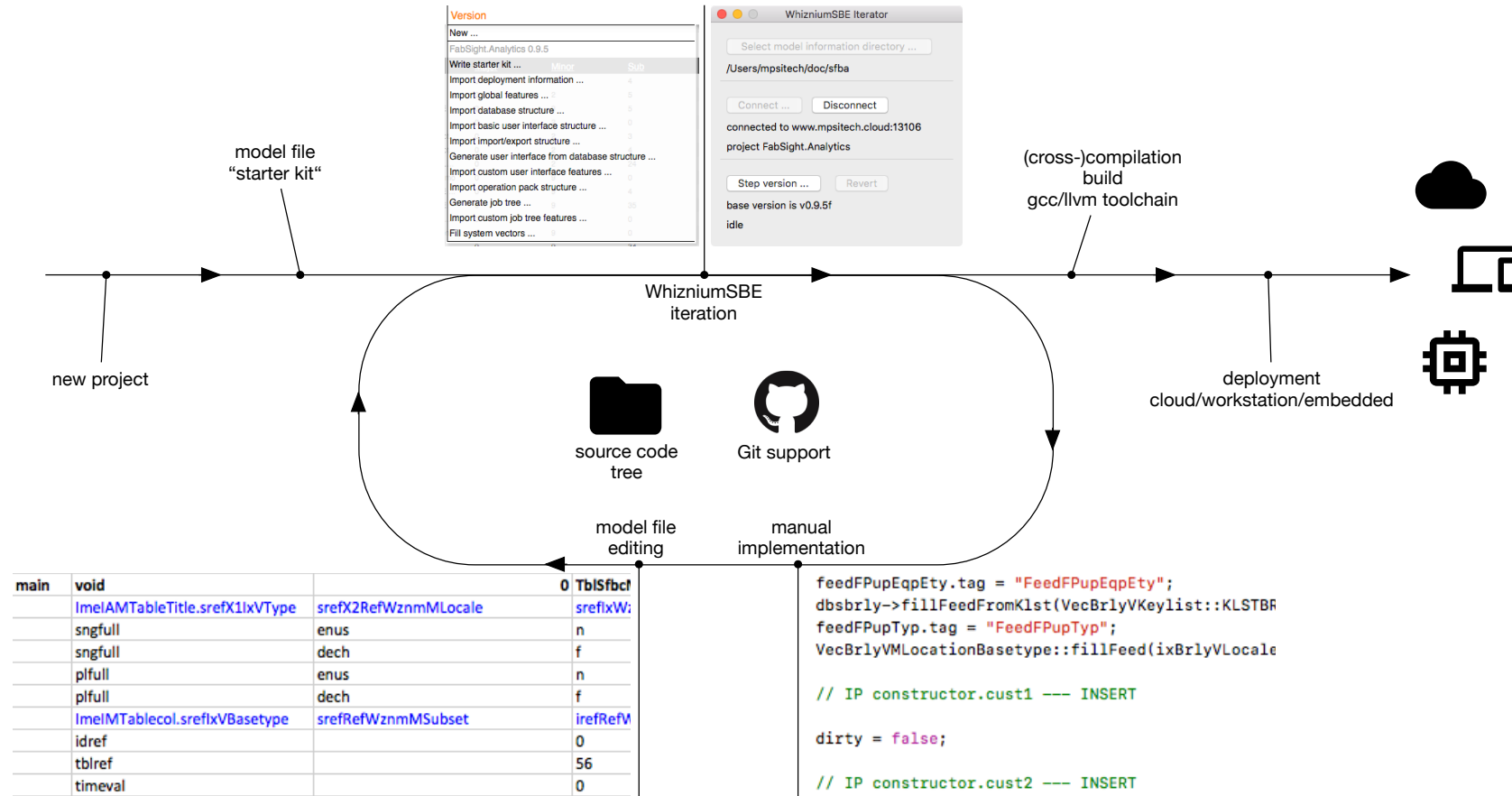
- Scope: device level to embedded system to cloud / internet



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- Development workflow using Whiznium: manual coding alternating with model-based code generation



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- MPSI Technologies GmbH, based in Munich/Germany, incorporated in 2016 by Alexander Wirthmüller (MSc EE ETH Zurich 2008), Founder&Director
- Joined in 2018 by Ivo Hidschoff (BA IB 2006), Business Development Manager
- Timeline
 - Whiznium product history dates back 8+ years as A.W.'s side project
 - Initially conceived as tool to auto-generate web-UI's based on complex database models
 - Extended to running distributed simulations on compute clusters (e.g. ICNS BeamRelay paper 2014)
 - Embedded focus aligned with EU FP7 ICARUS project multi-camera sensing device (2012-2016)
 - 18 more months of development to achieve market-readiness
 - Market entry in March 2018

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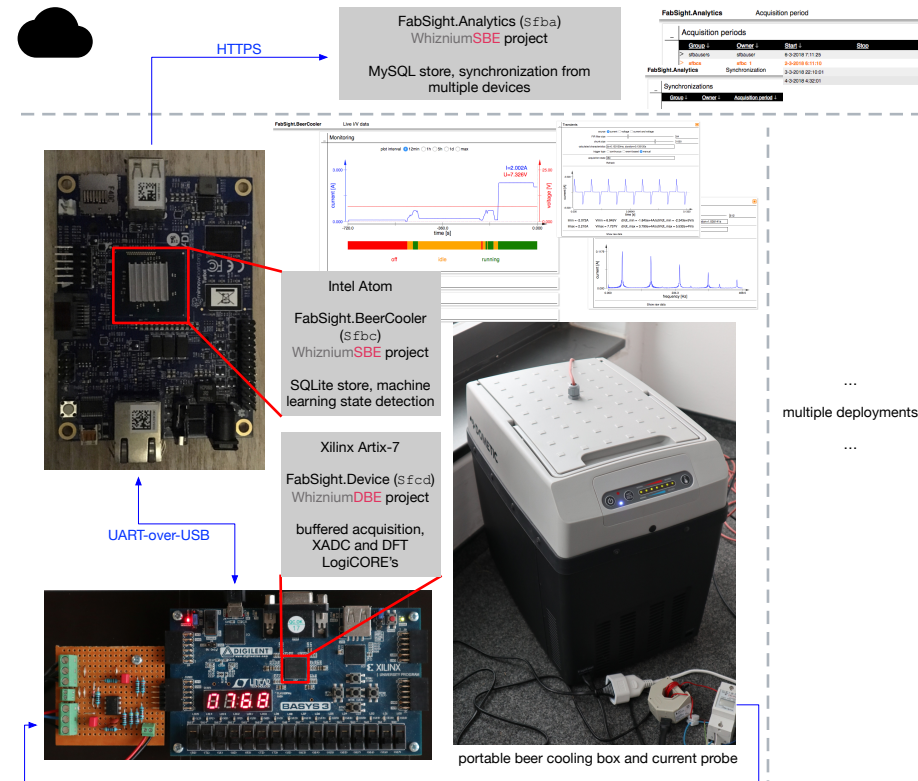
- Embedded systems based on single board computers running Linux
 - Booth at the Embedded Linux Conference Europe 2018 in Edinburgh, UK
 - 100+ leads in three days of which 60% were presented with an in-depth source code walkthrough
 - Representatives from OEM's (Xilinx, ARM, Intel, ...), potential customers (Bosch, GE Healthcare, Bruker, ...) and engineering service providers – last but not least: some Linux veterans visited



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- Industrial Automation applications, enabled by OPC UA connector ; MPSI is member of the Matrikon (Honeywell) Eco Partner Program since June 2018
 - Joint marketing activities (planned): demonstrator at sps|ipc|drives 2018, webinar



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- Robotics and automotive (tier 2/3) applications, enabled by DDS connector ; MPSI partners with Real-Time Innovations
- Strong position for sensing applications (e.g. machine vision) with custom hardware (“lab-to-market”) and Industrie 4.0 compatible connectivity, owing to Whiznium project history
 - Membership in European Photonics Industry Consortium (planned)

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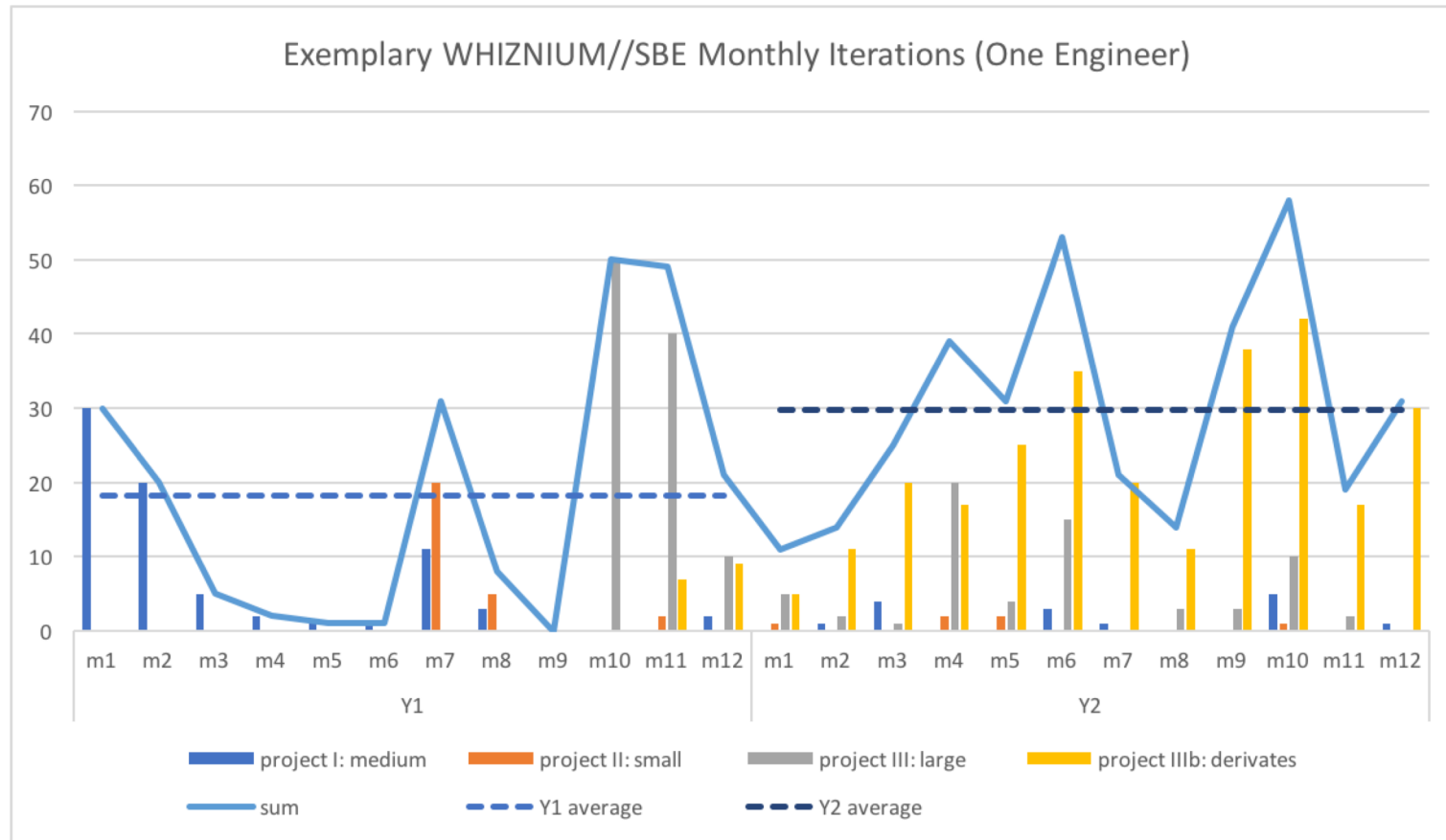
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- Make Whiznium the tool of choice for embedded / IIoT software development: enabler for AI, machine learning, data processing “on the edge”
 - Facilitate on-boarding: create tutorials, pack attractive starter kit that includes a standard evaluation board (e.g. Xilinx Arty Z7)
 - Invest in marketing activities: be represented at all relevant industry-leading events, highlight use cases in journals
 - Improve web presence into a one-stop portal for Whiznium users
 - Self-service, community edition of Whiznium, maybe even open source Whiznium under GPL
- Revenue streams
 - Collaboration with customers on their projects
 - Customer-specific Whiznium extensions
 - On-premises installation (container-based): concept of iteration credit
 - Offer OEM’s (Xilinx, ARM, Intel, ...) to support features specific to their offerings
 - Pay-by-the-hour cloud-based service (proven concept in aws cloud)

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- Iteration credits example



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- Growth perspective
 - Team of five full-time employees by mid-2019, HR expenses of k€350
 - 1x director
 - 1x business development, marketing, finance
 - 3x embedded software experts working 70% as field application engineers and 30% on Whiznium
 - Other expenses in 2019 (office, marketing): k€80
 - Revenue in 2019: k€450, mainly from project work. Maybe funding for R&D projects
- Once established, increasingly shift to revenue from
 - Iteration credits (scales independently of MPSI headcount)
 - Strategic partnerships with OEM's