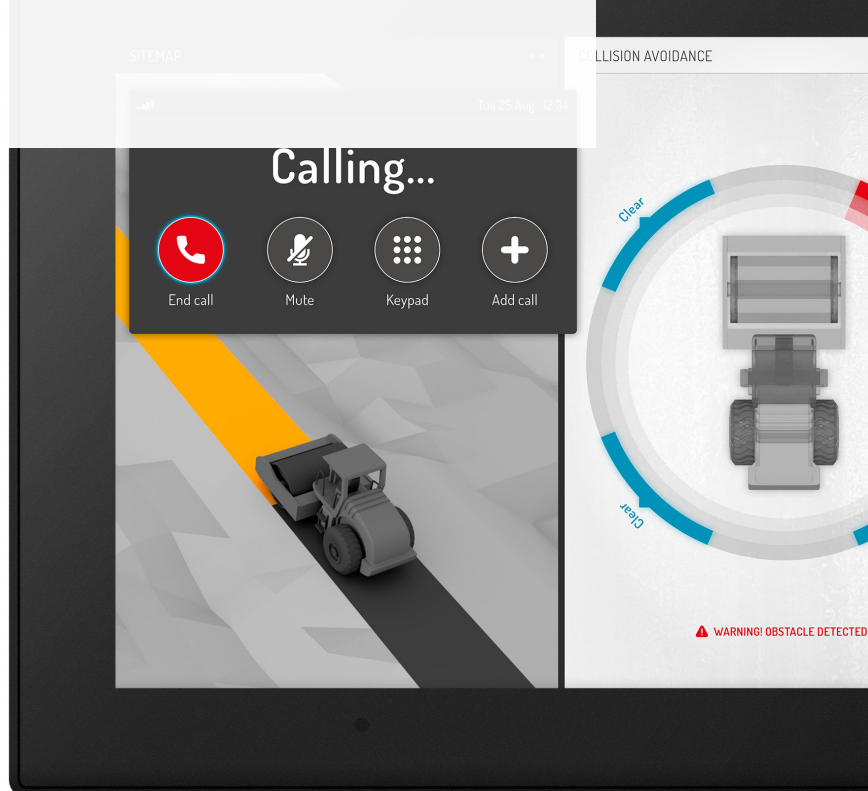
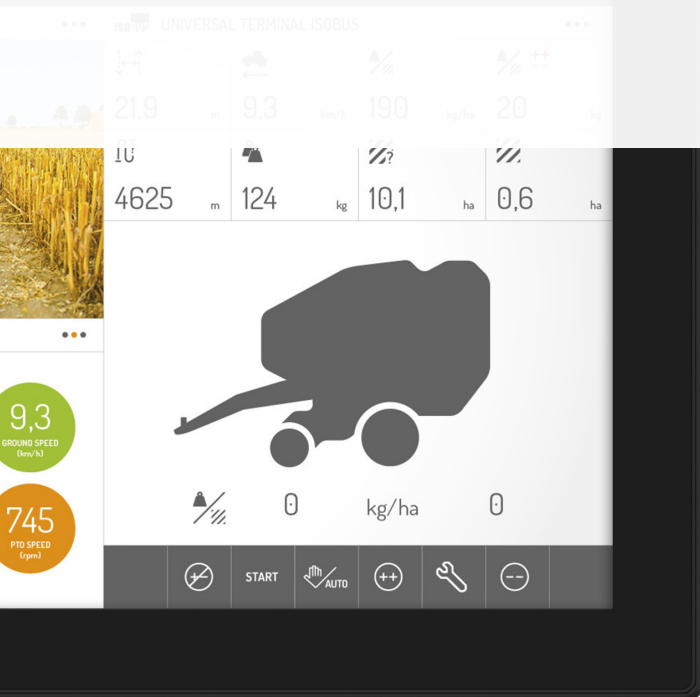




LinX

SOFTWARE PLATFORM FOR HMI DISPLAY SYSTEMS

An open and modular software platform for CrossControl display computers, offering freedom of choice, making system development leaner, and supporting a wide spectrum of HMI functionality.

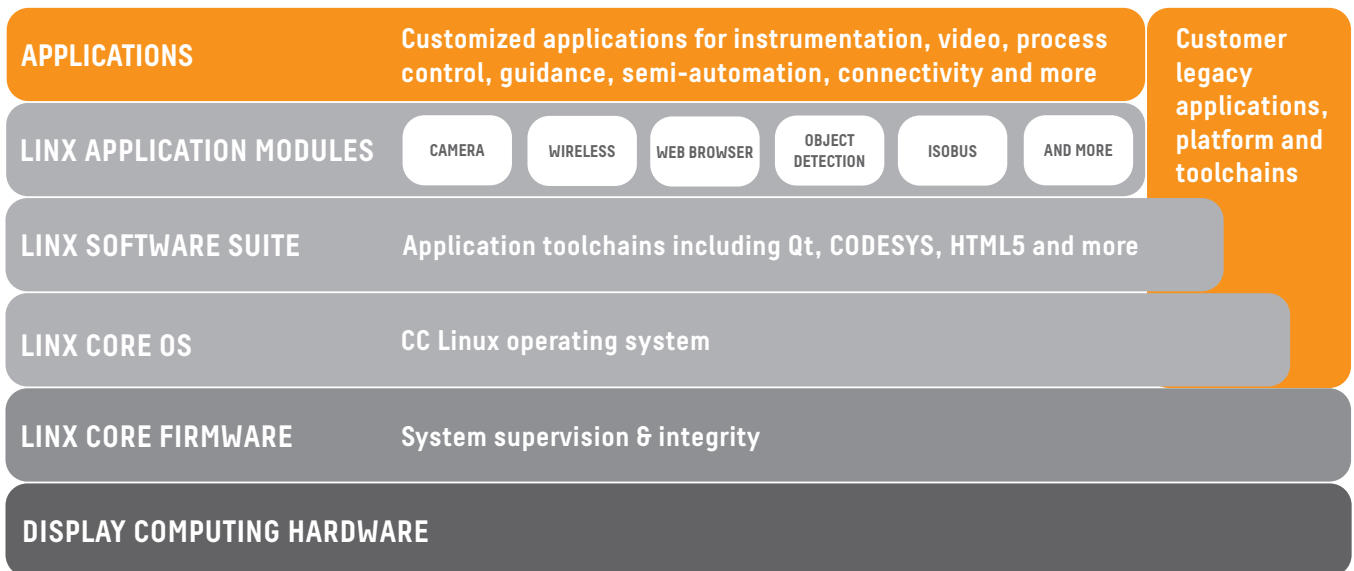


LINX OVERVIEW

LinX is an open and modular software platform available with our entire range of display computers in sizes 3.5" to 14". It includes core software from the firmware level and OS implementation up to application development toolchains and application modules.

System designers can choose the level and configuration of the platform that fits their needs and can work with, not against, the expertise and resources they already have. With the open platform approach, customers can base their solution on a robust and secure base while keeping the

flexibility to use inhouse or 3rd party development resources. Plus, developers can make use of alternative toolchains and easily deploy existing inhouse or 3rd party applications.



SOFTWARE IN INDUSTRIAL VEHICLES

Similarly to the automotive market, software content in industrial vehicle systems is increasing dramatically. Many vehicle innovations and new features are software intensive, be it systems for instrumentation, vision, guidance, process control, telematics, automation, or machine learning. Developing

software for a modern vehicle system is complex and, as in automotive, sourcing and integrating both applications and commodity software from 3rd party suppliers is a desirable strategy. Automobiles, and industrial vehicles, are moving towards a new software platform, similar to the smartphone platform creation in

2007. An open software platform approach in the vehicle system architecture improves access to software tools, 3rd party applications and developers.

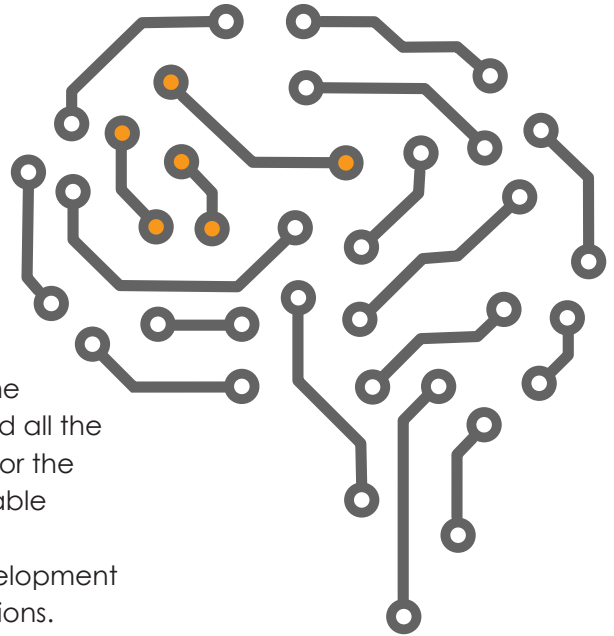
With a platform approach to software, OEMs and System Suppliers can focus on delivering their own innovation, value add and brand leadership

LINX CORE

THE FOUNDATION OF OUR PLATFORM FOR MACHINE INTELLIGENCE

LinX Core sits at the heart of our software platform and provides the necessary low-level software to support development of robust and secure systems and applications for both our ARM and x86-based devices.

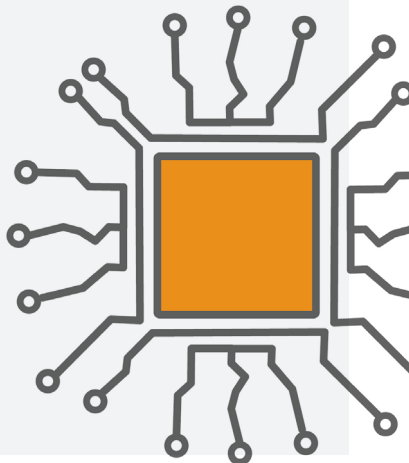
LinX Core includes the operating system and all the necessary firmware for the co-processors to enable complete platform functionality for development of industrial applications.



Customers are not limited to a proprietary operating system and the need to recode applications in only one programming language but are supported in developing the solution they need by working with, not against, the resources and skills they already have.

FIRMWARE

With displays and computers running applications that are mission critical for the equipment, reliable and safe operations is of utmost importance. Our firmware includes system supervision, boot loading, power management and other core features necessary for ensuring reliable and safe operations in all conditions.

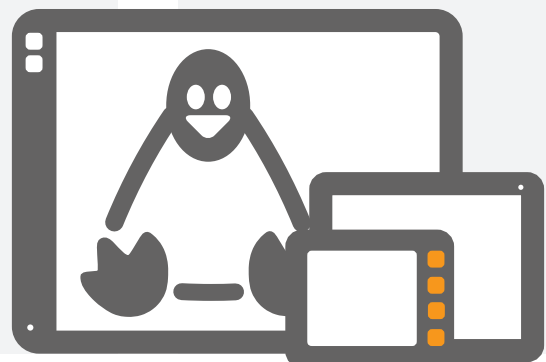


CC LINUX

CC Linux is a fully fledged and complete distribution of the world's most popular operating system with no limitations, offering rich features and extensive development support, tailored to the needs of our customers and purpose built for our hardware. CC Linux is an open and continuously developed OS, applied across all display computer models to support easy re-use of software.

BSP AND SDK

Both Software Development Kits (SDK) and Board Support Packages (BSP) are available for all CrossControl displays and controllers. When preferred, it allows customers the tools they need to build and maintain their own version of Linux. Product configuration can easily be done through the powerful CCAux API (available as a C++ API) or through the CC settings application.



LINX SOFTWARE SUITE

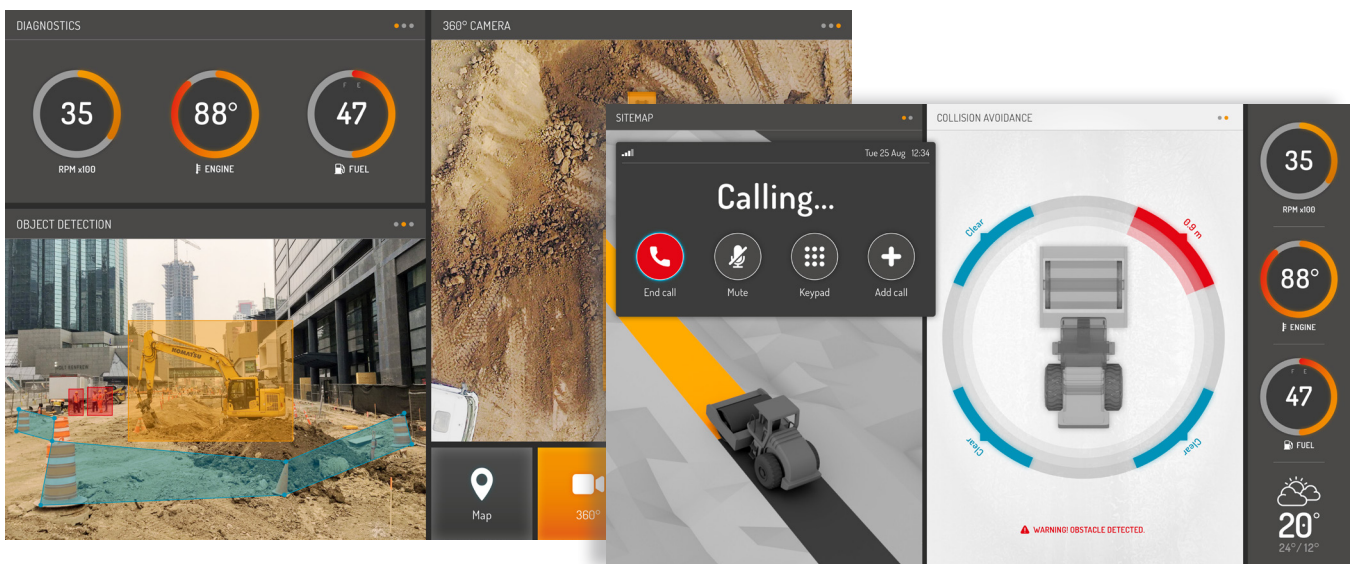
POWERFUL TOOLCHAINS FOR APPLICATION DEVELOPMENT

LinX Software Suite contains our pre-packaged toolchains for developing applications with powerful and state-of-the-art tools for graphics, controls and fieldbus networking. It supports two main development tracks, Qt-based system development or development according to the IEC61131-3 standard for PLC programming utilising

CODESYS. The two toolchains can be used in parallel to develop Qt and CODESYS applications that are tightly integrated, leveraging the benefits of respective toolchain.

The LinX Software Suite includes libraries for accessing and interfacing with commonly

required functionality and peripheral devices and advanced sensors. The toolchain is available on all CrossControl computing products with ARM or x86 cores, covering displays in the size range 3.5'' to 14''.



QT-BASED DEVELOPMENT

Qt offers industry leading tools and resources for developing graphical user interfaces with enormous community support and more than 1 million active developers. Our modular technology platform supports both the use of Qt 5 or 6, as Qt Open Source, Qt Professional, or Qt Enterprise. The Qt based toolchain is our primary choice for extending our platform with new modules and features.

UX Designer is a pre-packaged toolchain for development of software applications. In addition to the GUI design and C++ backend toolchain it also contains libraries, compilers, debuggers and project start-up wizards for all display devices.

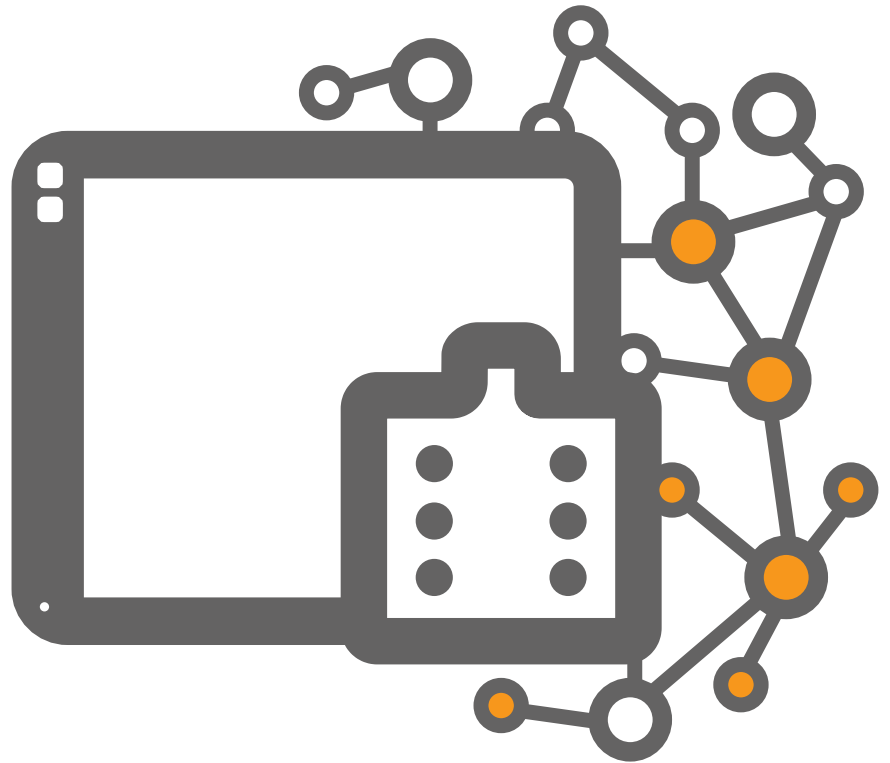
Data Engine acts as a signal manager and gateway that efficiently handles the routing of communication inside the system. It includes resources

for internal communication with a content independent signal interface, open API for adding custom software, proprietary or legacy software and a debugging application.

Fieldbus Access enables easy access from Qt to control J1939 and CANopen communication. It also includes network management for both J1939 and CANopen and is configured in UX Designer.

PLC TOOLCHAIN BASED ON CODESYS

CODESYS can be used as a distinct toolchain in place of the Qt-based toolchain or combined with it. CODESYS is one of the worlds most widely spread soft PLCs and provides a fieldbus network infrastructure out-of-the-box including CANopen, J1939 and Modbus. The newer versions of CODESYS (3.5.17+) support graphical acceleration which now places it as a serious alternative for building premium graphical user interfaces.



LINX APPLICATION MODULES

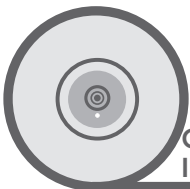
ADD FUNCTIONALITY TO ANY DEPLOYMENT

Through its modular structure, the platform can be used to achieve HMI and machine control as well as advanced

operational support features. To enable commonly desired functionality, independent application modules are

available with easy to use, and well documented instruction sets, code examples, packages, and guides.

EXAMPLES OF LINX APPLICATION MODULES



CAMERA INTEGRATION

Visualization and control of multiple camera streams



OBJECT DETECTION

Implement AI based solutions for computer vision



SCREEN SHARING

Share and control screen content between systems



WIRELESS CONNECTIVITY

Add wireless communications over Bluetooth and Wi-Fi



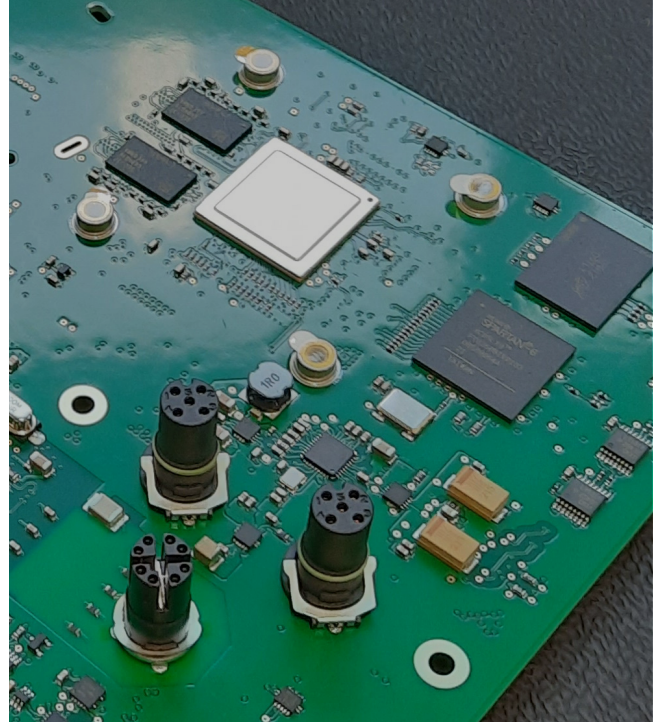
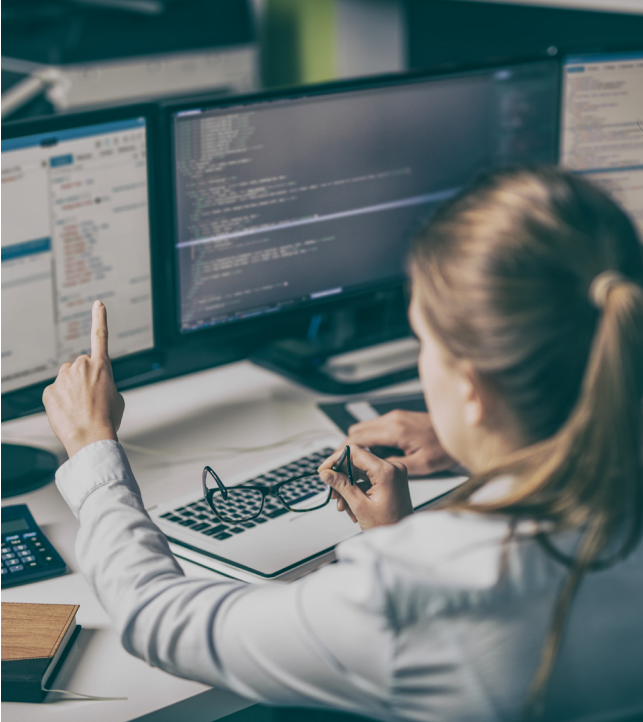
WEB BROWSER

Embedded chromium based HTML5 web browser



ISO BUS

Add Universal Terminal functionality



INHERENT SUPPORT

A PLATFORM THAT OFFERS CHOICE FOR CUSTOMER PROJECTS

Designers are free to choose the level of support they desire and leverage the CrossControl platform at the firmware, BSP, OS, or toolchain level. We base our products on CPU architectures that support a wide spectrum of software frameworks. Developers can use alternative toolchains like HTML5, Flutter, and Unity to take advantage of in-house resources or existing products. Building applications with our pre-packaged toolchain does not lock developers into the platform. Instead in-house, 3rd party, or legacy applications can be freely added to the deployment package for a CrossControl device.

In some cases, system designers want to isolate applications in order to enable a consistent environment, manage updates or restrict an application access. On our platform this can be achieved with

"Designers are free to choose the level of support they desire"

lightweight containers like Docker. For less strict separation, alternative graphics frameworks can be used for each application and run simultaneously. This is illustrated in the demo system

available with our products where applications developed with a variety of toolchains are run in split screen simultaneously.

The open platform allows for developers to take advantage of different toolchains and approaches to development. Paths include Unity, MATLAB, HTML5, Python, C/C++, and Flutter, with the platform supporting many other options.

The platform also offers inherent support for software over the air updates, advanced camera functionality, driver assistance systems, phone integration, safe rendering, functional safety, and audio features.

ENGINEERING SUPPORT

A TRUSTED PARTNER, SUPPORTING THE SUCCESS OF CUSTOMER PROJECTS FOR OVER 30 YEARS

CrossControl has considerable in-house expertise in software systems and development to help customers create applications for our hardware at either the LinX core/OS level, toolchain level or application level. Our worldwide network of Field Application Engineers and Subject Matter Experts in Linux and Qt support customers

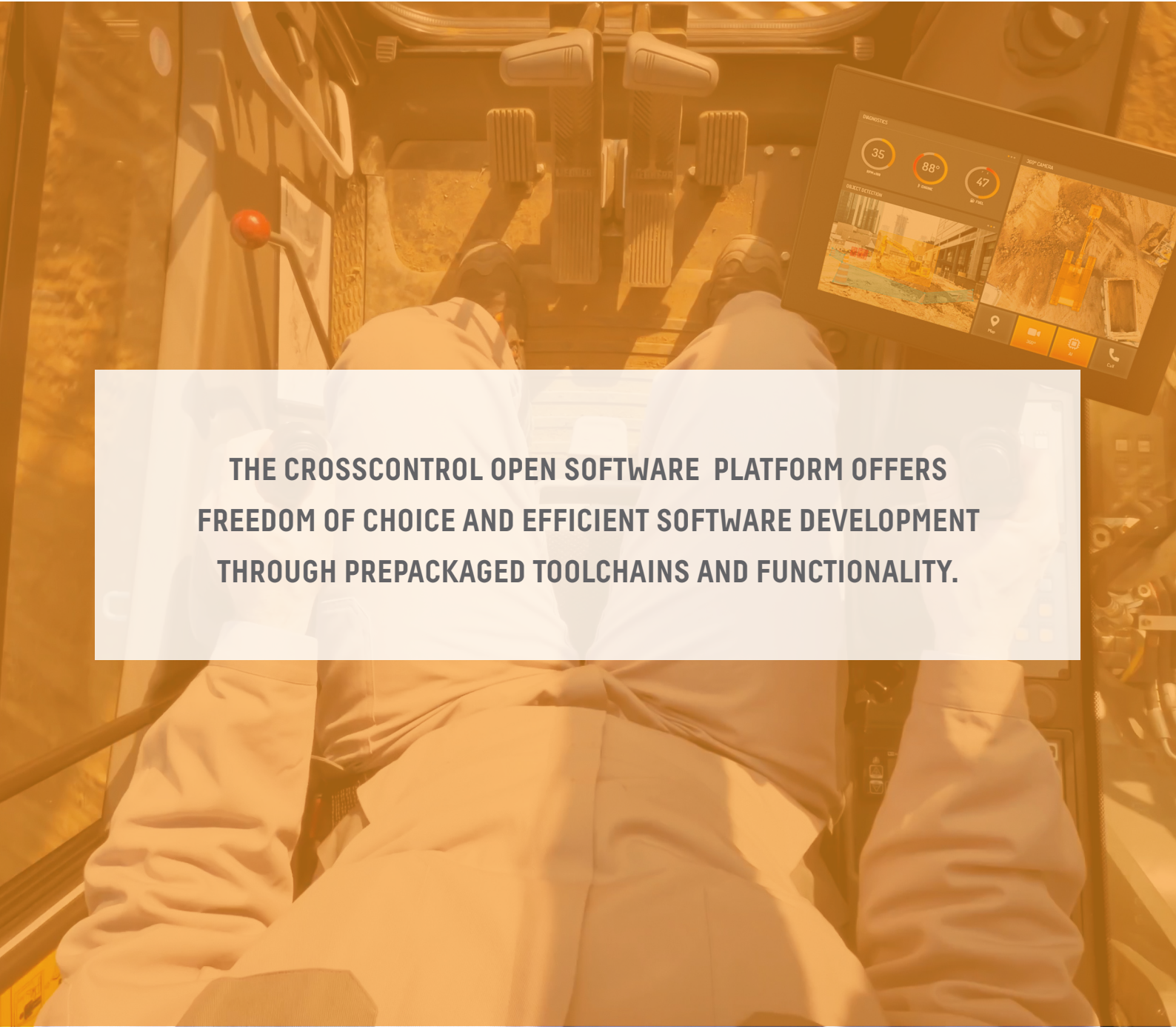
in adopting the software platform in their context and using it efficiently. We also offer software services to customers, for example the development of customized platform solutions and applications.

Our engineers continuously explore, develop, and test, alternative and complimentary

frameworks and toolchains for compatibility and what opportunities they present. We share our findings on our website as a Module or Solution so that system designers and developers can see what options are available for their next project.

" Our Field Application Engineers and Subject Matter Experts help customers succeed with projects"





**THE CROSSCONTROL OPEN SOFTWARE PLATFORM OFFERS
FREEDOM OF CHOICE AND EFFICIENT SOFTWARE DEVELOPMENT
THROUGH PREPACKAGED TOOLCHAINS AND FUNCTIONALITY.**

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