NEWS

What the field knows about data architecture and ScreenWay knows about permaculture

It is not the individual plant or the individual display that creates value, but the diversity of sources that make a common substrate fertile. Monoculture harvests once, permaculture continuously.

13 June 2026, Tobias Engl

Plants constantly release substances called root exudates through their roots. An astonishing up to 50 percent of the carbon produced by photosynthesis actively flows into the soil to feed microorganisms, attract specific nutrients, make nutrients available, suppress pathogens and control symbioses with mycorrhizal fungi or nodule bacteria. The cocktail consists of sugars (fast energy), amino acids (organic nitrogen), organic acids (they dissolve minerals and change the pH), secondary plant substances such as phenols and flavonoids (signal, defense, attractant) as well as mucilage and polysaccharides (stable aggregates and biofilms).

Each plant species has its own recipe. Legumes attract rhizobia via flavonoids and enable nitrogen fixation, grasses release a particularly large amount of sugar, cruciferous plants antimicrobial mustard oils, trees above all phenols, which promote a fungus-rich soil environment. The result is simple and far-reaching. Diversity above creates diversity below. A

monoculture impoverishes soil life; a permaculture makes it rich and resilient.

This is precisely the pattern described by an agent-based IT architecture. Each connected system - display, sensor, merchandise management system, app - continuously releases signals into a common substrate, just like a root releases its exudates. Real-time data feeds the monitoring like sugar feeds bacteria; metadata provides building blocks like amino acids provide nitrogen; a normalization layer makes raw data connectable, like organic acids dissolve minerals; protocol signals coordinate the agents via MCP and A2A, fend off threats and integrate new partners, like secondary substances signal and attract. A stable integration layer holds the whole thing together like mucilage holds the soil aggregates together.

For ScreenWay, the lesson is immediate. A screen that only shows one poster is a monoculture. ScreenWay's thirteen verticals, its sensors, apps and ERP connections are the permaculture - many different "species" that nurture a rich, resilient data ecosystem. The value is not created in the individual display, but in the soil beneath it; in the diversity of sources that make each other fruitful via open standards.

Healthy soil cannot be forced, only enabled - through diversity, open standards and patience. The same goes for a healthy data architecture. If you rely on a single source, you reap once; if you sow diversity, you reap every season. The field knew that first.

Sources:

OVERVIEWS & BASICS

McNear, D. H. (2013): The Rhizosphere - Roots, Soil and Everything In Between. Nature Education Knowledge 4(3):1 - Evidence of the release of around 10-40 % of photosynthetically bound carbon (after Newman 1985; Jones et al. 2009).

Bais, H. P., Weir, T. L., Perry, L. G., Gilroy, S., Vivanco, J. M. (2006): The role of root exudates in rhizosphere interactions with plants and other organisms. Annual Review of Plant Biology 57: 233-266 - Standard reference on the function and effect of root exudates.

Jones, D. L., Nguyen, C., Finlay, R. D. (2009): Carbon flow in the rhizosphere: carbon trading at the soil-root interface. Plant and Soil 321: 5-33 - Quantification of carbon flow into the rhizosphere.

Nguyen, C. (2003): Rhizodeposition of organic C by plants: mechanisms and controls. Agronomy 23: 375-396 - Conservative estimate of the amount of exudate (5-21 %).

COMPOSITION & SPECIES-SPECIFIC PATTERNS

Vives-Peris, V. et al / Korenblum, E. et al (2020): Overviews of primary and secondary metabolites of root exudation (sugars, amino acids, organic acids, phenols, flavonoids, terpenoids, mucilages).

Bressan, M. et al. (2009): Exogenous glucosinolate produced by Arabidopsis thaliana has an impact on microbes in the rhizosphere and plant roots. The ISME Journal 3: 1243-1257 - Evidence for the antimicrobial effect of cruciferous mustard oils (glucosinolates/isothiocyanates).

Studies on tree species and forest soils (e.g. temperate forest ecosystem, 2024) and on the enrichment of fungal communities by flavonoids and phenolic acids - prove the phenol-related fungal accentuation in tree soils.

Legume-flavonoid-rhizobia symbiosis: textbook knowledge of biological nitrogen fixation, listed as a standard example in all the reviews mentioned.