



L'Intelligenza Artificiale come abilitatore essenziale per l'Industria 4.0

Andrea Boccotti
IBM

Organizzato da



Gather the data

- Instrument your equipment/assets to collect data
- Gather already existing data from various sources



Connect assets, outfitted with sensor or data gathered

- Robots
- Medical devices
- Transformers
- Turbines
- Engines

Visualize the patterns

- Visualize your data in meaningful dashboards
- Start to see patterns
- Build with Watson IoT solutions



Quickly build dashboards for data & process visualization

Advance to analytics

- Gain insights from the data
- Produce models, prediction, issue detection patterns
- Propose resolution and recommendations



Use analytical models to predict equipment failures and provide recommendations

Infuse with cognitive

- Refine models with cognitive machine learning
- Utilize other cognitive functions to improve engagement



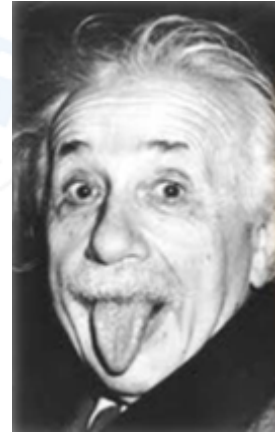
Use speech, video, image to diagnose complex problems

So what is Artificial Intelligence?

The capability of performing intelligent human processes as **Learning, Reasoning, Problem solving, Perception, Language understanding, etc**

AI has become an essential part of the technology industry, providing the heavy lifting for many of the most difficult problems in computer science.

Prediction, Classification, Regression, Clustering, Function optimization



Why AI is essential for Industry 4.0 ?

- Economical needs
 - Experts highly qualified are expensive and unaffordable
 - A way for training new experts
 - Knowledge preservation
- Computational efficiency
 - General decision methods are slowly and inefficient
 - Massive information needs to be processed
- Decision support system
 - Get fast, efficient and justified decisions
 - Autonomous decisions systems



Companies need specific systems to solve specific problems using the knowledge from domain and the expertise from experts .

They want to introduce our “minds” and “human capabilities” in their systems

Anyway ... We prefer to talk about Augmented Intelligence



Visual Inspection for Quality

Image Analytics

Enables monitoring of unstructured data from images snapshots to identify quality defects and failure patterns



Machine Learning

Automates data processing, identifies the best model for the data and continuously monitors new data to learn and improve results



Cognitive Plant Advisor



Equipment Advisor

Textual Analytics

Enables mining of textual sources to find correlations and patterns in structured and unstructured text such as logs and notes



Acoustics Analytics

Utilizes audio as an additional source of unstructured data to enable anomaly detection and pattern recognition



Audio Insights



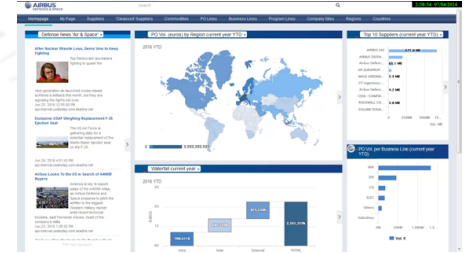
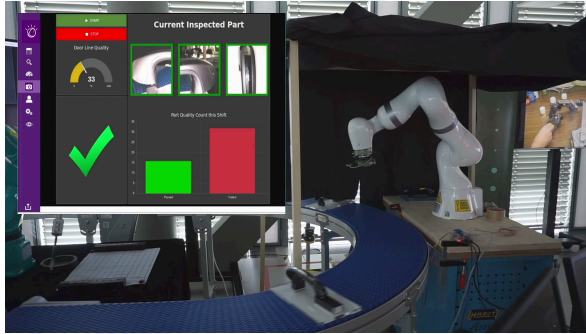
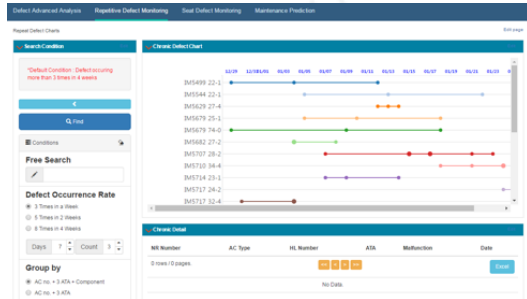
FEDERAZIONE NAZIONALE
IMPRESE ELETTROTECNICHE
ED ELETTRONICHE



Some applications



Diagnosis & Repair assistance



Supply Chain Intelligence

Defect Tracking @ Maintenance Advisor



Stay hello to **Watson**, a cognitive computing system that can interpret and classify system requirements from text documents. Add a proposal or written project description to get started.

EPC Advisor

Extract
Watson shall extract system requirements and obligations from RFP

"Silent" Requirements
For each requirement, Watson shall find related regulations and extract the applicable obligations from the regulations and classify it

Lessons Learned
For each requirement, Watson shall display relevant lessons learned

Vague Requirements
For each requirement, Watson shall indicate whether the requirement is not sufficiently specific.

Specification Recommendations
For each requirement, Watson shall recommend proposal specifications based on past proposals

Identifying hidden requirements, important lessons learned, and requirements that are vague can significantly **reduce project risk**



Cybersecurity

Knowledge Management & Expertise Sharing -Engineering assistant

The screenshot displays a mobile application interface on the left and a web browser on the right. The mobile app, titled "Vehicle Monitor", shows a "Car Profile" section with fields for "Fuel: petrol", "Litres: 2", "Cylinder: 4", and "RPM: 1500". The browser window shows the "IBM Watson IoT Platform" dashboard, specifically the "Devices" page. The dashboard includes a navigation menu, a search bar, and a table of device information. A yellow circle highlights the "Device ID" column header in the table.

Device ID	Device Type	Class ID	Date Added	Location
0021cc65a48e	connectedVehicle	Device	Feb 3, 2016 10:34:39 AM	

Pdf-parser:

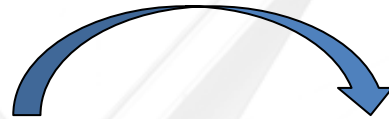
- Parses the pdf-code and presents the raw data of the pdf (text-cells, embedded images and vector-graphics in consumable format)

Pdf-interpreter:

- Captures ground truth by massive Crowd-sourcing big Data system
- Uses HPC for ML-techniques (Deep Learning), to train automatic annotation models

Semantic-representation:

- Uses HPC & Big Data systems to obtain a semantic representation in JSON-format of the original text



Journal of Structural Geology
Analysis of the internal structure of a carbonate damage zone: Implications for the mechanisms of fault breccia formation and fluid flow

Stefan Haeggeberg*, Walter Kienast, Robert Kabisch, Eva Kienast, Josef Pfleger†

ARTICLE INFO
ABSTRACT

1. Introduction
Knowledge of the internal structure of brittle fault zones has been growing from both field studies (e.g. Anderson, 1952; 1960; 1962; 1963; 1964; 1965; 1966; 1967; 1968; 1969; 1970; 1971; 1972; 1973; 1974; 1975; 1976; 1977; 1978; 1979; 1980; 1981; 1982; 1983; 1984; 1985; 1986; 1987; 1988; 1989; 1990; 1991; 1992; 1993; 1994; 1995; 1996; 1997; 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010; 2011; 2012; 2013; 2014; 2015; 2016; 2017; 2018; 2019; 2020; 2021; 2022; 2023; 2024; 2025; 2026; 2027; 2028; 2029; 2030; 2031; 2032; 2033; 2034; 2035; 2036; 2037; 2038; 2039; 2040; 2041; 2042; 2043; 2044; 2045; 2046; 2047; 2048; 2049; 2050; 2051; 2052; 2053; 2054; 2055; 2056; 2057; 2058; 2059; 2060; 2061; 2062; 2063; 2064; 2065; 2066; 2067; 2068; 2069; 2070; 2071; 2072; 2073; 2074; 2075; 2076; 2077; 2078; 2079; 2080; 2081; 2082; 2083; 2084; 2085; 2086; 2087; 2088; 2089; 2090; 2091; 2092; 2093; 2094; 2095; 2096; 2097; 2098; 2099; 2100; 2101; 2102; 2103; 2104; 2105; 2106; 2107; 2108; 2109; 2110; 2111; 2112; 2113; 2114; 2115; 2116; 2117; 2118; 2119; 2120; 2121; 2122; 2123; 2124; 2125; 2126; 2127; 2128; 2129; 2130; 2131; 2132; 2133; 2134; 2135; 2136; 2137; 2138; 2139; 2140; 2141; 2142; 2143; 2144; 2145; 2146; 2147; 2148; 2149; 2150; 2151; 2152; 2153; 2154; 2155; 2156; 2157; 2158; 2159; 2160; 2161; 2162; 2163; 2164; 2165; 2166; 2167; 2168; 2169; 2170; 2171; 2172; 2173; 2174; 2175; 2176; 2177; 2178; 2179; 2180; 2181; 2182; 2183; 2184; 2185; 2186; 2187; 2188; 2189; 2190; 2191; 2192; 2193; 2194; 2195; 2196; 2197; 2198; 2199; 2200; 2201; 2202; 2203; 2204; 2205; 2206; 2207; 2208; 2209; 2210; 2211; 2212; 2213; 2214; 2215; 2216; 2217; 2218; 2219; 2220; 2221; 2222; 2223; 2224; 2225; 2226; 2227; 2228; 2229; 2230; 2231; 2232; 2233; 2234; 2235; 2236; 2237; 2238; 2239; 2240; 2241; 2242; 2243; 2244; 2245; 2246; 2247; 2248; 2249; 2250; 2251; 2252; 2253; 2254; 2255; 2256; 2257; 2258; 2259; 2260; 2261; 2262; 2263; 2264; 2265; 2266; 2267; 2268; 2269; 2270; 2271; 2272; 2273; 2274; 2275; 2276; 2277; 2278; 2279; 2280; 2281; 2282; 2283; 2284; 2285; 2286; 2287; 2288; 2289; 2290; 2291; 2292; 2293; 2294; 2295; 2296; 2297; 2298; 2299; 2300; 2301; 2302; 2303; 2304; 2305; 2306; 2307; 2308; 2309; 2310; 2311; 2312; 2313; 2314; 2315; 2316; 2317; 2318; 2319; 2320; 2321; 2322; 2323; 2324; 2325; 2326; 2327; 2328; 2329; 2330; 2331; 2332; 2333; 2334; 2335; 2336; 2337; 2338; 2339; 2340; 2341; 2342; 2343; 2344; 2345; 2346; 2347; 2348; 2349; 2350; 2351; 2352; 2353; 2354; 2355; 2356; 2357; 2358; 2359; 2360; 2361; 2362; 2363; 2364; 2365; 2366; 2367; 2368; 2369; 2370; 2371; 2372; 2373; 2374; 2375; 2376; 2377; 2378; 2379; 2380; 2381; 2382; 2383; 2384; 2385; 2386; 2387; 2388; 2389; 2390; 2391; 2392; 2393; 2394; 2395; 2396; 2397; 2398; 2399; 2400; 2401; 2402; 2403; 2404; 2405; 2406; 2407; 2408; 2409; 2410; 2411; 2412; 2413; 2414; 2415; 2416; 2417; 2418; 2419; 2420; 2421; 2422; 2423; 2424; 2425; 2426; 2427; 2428; 2429; 2430; 2431; 2432; 2433; 2434; 2435; 2436; 2437; 2438; 2439; 2440; 2441; 2442; 2443; 2444; 2445; 2446; 2447; 2448; 2449; 2450; 2451; 2452; 2453; 2454; 2455; 2456; 2457; 2458; 2459; 2460; 2461; 2462; 2463; 2464; 2465; 2466; 2467; 2468; 2469; 2470; 2471; 2472; 2473; 2474; 2475; 2476; 2477; 2478; 2479; 2480; 2481; 2482; 2483; 2484; 2485; 2486; 2487; 2488; 2489; 2490; 2491; 2492; 2493; 2494; 2495; 2496; 2497; 2498; 2499; 2500; 2501; 2502; 2503; 2504; 2505; 2506; 2507; 2508; 2509; 2510; 2511; 2512; 2513; 2514; 2515; 2516; 2517; 2518; 2519; 2520; 2521; 2522; 2523; 2524; 2525; 2526; 2527; 2528; 2529; 2530; 2531; 2532; 2533; 2534; 2535; 2536; 2537; 2538; 2539; 2540; 2541; 2542; 2543; 2544; 2545; 2546; 2547; 2548; 2549; 2550; 2551; 2552; 2553; 2554; 2555; 2556; 2557; 2558; 2559; 2560; 2561; 2562; 2563; 2564; 2565; 2566; 2567; 2568; 2569; 2570; 2571; 2572; 2573; 2574; 2575; 2576; 2577; 2578; 2579; 2580; 2581; 2582; 2583; 2584; 2585; 2586; 2587; 2588; 2589; 2590; 2591; 2592; 2593; 2594; 2595; 2596; 2597; 2598; 2599; 2600; 2601; 2602; 2603; 2604; 2605; 2606; 2607; 2608; 2609; 2610; 2611; 2612; 2613; 2614; 2615; 2616; 2617; 2618; 2619; 2620; 2621; 2622; 2623; 2624; 2625; 2626; 2627; 2628; 2629; 2630; 2631; 2632; 2633; 2634; 2635; 2636; 2637; 2638; 2639; 2640; 2641; 2642; 2643; 2644; 2645; 2646; 2647; 2648; 2649; 2650; 2651; 2652; 2653; 2654; 2655; 2656; 2657; 2658; 2659; 2660; 2661; 2662; 2663; 2664; 2665; 2666; 2667; 2668; 2669; 2670; 2671; 2672; 2673; 2674; 2675; 2676; 2677; 2678; 2679; 2680; 2681; 2682; 2683; 2684; 2685; 2686; 2687; 2688; 2689; 2690; 2691; 2692; 2693; 2694; 2695; 2696; 2697; 2698; 2699; 2700; 2701; 2702; 2703; 2704; 2705; 2706; 2707; 2708; 2709; 2710; 2711; 2712; 2713; 2714; 2715; 2716; 2717; 2718; 2719; 2720; 2721; 2722; 2723; 2724; 2725; 2726; 2727; 2728; 2729; 2730; 2731; 2732; 2733; 2734; 2735; 2736; 2737; 2738; 2739; 2740; 2741; 2742; 2743; 2744; 2745; 2746; 2747; 2748; 2749; 2750; 2751; 2752; 2753; 2754; 2755; 2756; 2757; 2758; 2759; 2760; 2761; 2762; 2763; 2764; 2765; 2766; 2767; 2768; 2769; 2770; 2771; 2772; 2773; 2774; 2775; 2776; 2777; 2778; 2779; 2780; 2781; 2782; 2783; 2784; 2785; 2786; 2787; 2788; 2789; 2790; 2791; 2792; 2793; 2794; 2795; 2796; 2797; 2798; 2799; 2800; 2801; 2802; 2803; 2804; 2805; 2806; 2807; 2808; 2809; 2810; 2811; 2812; 2813; 2814; 2815; 2816; 2817; 2818; 2819; 2820; 2821; 2822; 2823; 2824; 2825; 2826; 2827; 2828; 2829; 2830; 2831; 2832; 2833; 2834; 2835; 2836; 2837; 2838; 2839; 2840; 2841; 2842; 2843; 2844; 2845; 2846; 2847; 2848; 2849; 2850; 2851; 2852; 2853; 2854; 2855; 2856; 2857; 2858; 2859; 2860; 2861; 2862; 2863; 2864; 2865; 2866; 2867; 2868; 2869; 2870; 2871; 2872; 2873; 2874; 2875; 2876; 2877; 2878; 2879; 2880; 2881; 2882; 2883; 2884; 2885; 2886; 2887; 2888; 2889; 2890; 2891; 2892; 2893; 2894; 2895; 2896; 2897; 2898; 2899; 2900; 2901; 2902; 2903; 2904; 2905; 2906; 2907; 2908; 2909; 2910; 2911; 2912; 2913; 2914; 2915; 2916; 2917; 2918; 2919; 2920; 2921; 2922; 2923; 2924; 2925; 2926; 2927; 2928; 2929; 2930; 2931; 2932; 2933; 2934; 2935; 2936; 2937; 2938; 2939; 2940; 2941; 2942; 2943; 2944; 2945; 2946; 2947; 2948; 2949; 2950; 2951; 2952; 2953; 2954; 2955; 2956; 2957; 2958; 2959; 2960; 2961; 2962; 2963; 2964; 2965; 2966; 2967; 2968; 2969; 2970; 2971; 2972; 2973; 2974; 2975; 2976; 2977; 2978; 2979; 2980; 2981; 2982; 2983; 2984; 2985; 2986; 2987; 2988; 2989; 2990; 2991; 2992; 2993; 2994; 2995; 2996; 2997; 2998; 2999; 3000; 3001; 3002; 3003; 3004; 3005; 3006; 3007; 3008; 3009; 3010; 3011; 3012; 3013; 3014; 3015; 3016; 3017; 3018; 3019; 3020; 3021; 3022; 3023; 3024; 3025; 3026; 3027; 3028; 3029; 3030; 3031; 3032; 3033; 3034; 3035; 3036; 3037; 3038; 3039; 3040; 3041; 3042; 3043; 3044; 3045; 3046; 3047; 3048; 3049; 3050; 3051; 3052; 3053; 3054; 3055; 3056; 3057; 3058; 3059; 3060; 3061; 3062; 3063; 3064; 3065; 3066; 3067; 3068; 3069; 3070; 3071; 3072; 3073; 3074; 3075; 3076; 3077; 3078; 3079; 3080; 3081; 3082; 3083; 3084; 3085; 3086; 3087; 3088; 3089; 3090; 3091; 3092; 3093; 3094; 3095; 3096; 3097; 3098; 3099; 3100; 3101; 3102; 3103; 3104; 3105; 3106; 3107; 3108; 3109; 3110; 3111; 3112; 3113; 3114; 3115; 3116; 3117; 3118; 3119; 3120; 3121; 3122; 3123; 3124; 3125; 3126; 3127; 3128; 3129; 3130; 3131; 3132; 3133; 3134; 3135; 3136; 3137; 3138; 3139; 3140; 3141; 3142; 3143; 3144; 3145; 3146; 3147; 3148; 3149; 3150; 3151; 3152; 3153; 3154; 3155; 3156; 3157; 3158; 3159; 3160; 3161; 3162; 3163; 3164; 3165; 3166; 3167; 3168; 3169; 3170; 3171; 3172; 3173; 3174; 3175; 3176; 3177; 3178; 3179; 3180; 3181; 3182; 3183; 3184; 3185; 3186; 3187; 3188; 3189; 3190; 3191; 3192; 3193; 3194; 3195; 3196; 3197; 3198; 3199; 3200; 3201; 3202; 3203; 3204; 3205; 3206; 3207; 3208; 3209; 3210; 3211; 3212; 3213; 3214; 3215; 3216; 3217; 3218; 3219; 3220; 3221; 3222; 3223; 3224; 3225; 3226; 3227; 3228; 3229; 3230; 3231; 3232; 3233; 3234; 3235; 3236; 3237; 3238; 3239; 3240; 3241; 3242; 3243; 3244; 3245; 3246; 3247; 3248; 3249; 3250; 3251; 3252; 3253; 3254; 3255; 3256; 3257; 3258; 3259; 3260; 3261; 3262; 3263; 3264; 3265; 3266; 3267; 3268; 3269; 3270; 3271; 3272; 3273; 3274; 3275; 3276; 3277; 3278; 3279; 3280; 3281; 3282; 3283; 3284; 3285; 3286; 3287; 3288; 3289; 3290; 3291; 3292; 3293; 3294; 3295; 3296; 3297; 3298; 3299; 3300; 3301; 3302; 3303; 3304; 3305; 3306; 3307; 3308; 3309; 3310; 3311; 3312; 3313; 3314; 3315; 3316; 3317; 3318; 3319; 3320; 3321; 3322; 3323; 3324; 3325; 3326; 3327; 3328; 3329; 3330; 3331; 3332; 3333; 3334; 3335; 3336; 3337; 3338; 3339; 3340; 3341; 3342; 3343; 3344; 3345; 3346; 3347; 3348; 3349; 3350; 3351; 3352; 3353; 3354; 3355; 3356; 3357; 3358; 3359; 3360; 3361; 3362; 3363; 3364; 3365; 3366; 3367; 3368; 3369; 3370; 3371; 3372; 3373; 3374; 3375; 3376; 3377; 3378; 3379; 3380; 3381; 3382; 3383; 3384; 3385; 3386; 3387; 3388; 3389; 3390; 3391; 3392; 3393; 3394; 3395; 3396; 3397; 3398; 3399; 3400; 3401; 3402; 3403; 3404; 3405; 3406; 3407; 3408; 3409; 3410; 3411; 3412; 3413; 3414; 3415; 3416; 3417; 3418; 3419; 3420; 3421; 3422; 3423; 3424; 3425; 3426; 3427; 3428; 3429; 3430; 3431; 3432; 3433; 3434; 3435; 3436; 3437; 3438; 3439; 3440; 3441; 3442; 3443; 3444; 3445; 3446; 3447; 3448; 3449; 3450; 3451; 3452; 3453; 3454; 3455; 3456; 3457; 3458; 3459; 3460; 3461; 3462; 3463; 3464; 3465; 3466; 3467; 3468; 3469; 3470; 3471; 3472; 3473; 3474; 3475; 3476; 3477; 3478; 3479; 3480; 3481; 3482; 3483; 3484; 3485; 3486; 3487; 3488; 3489; 3490; 3491; 3492; 3493; 3494; 3495; 3496; 3497; 3498; 3499; 3500; 3501; 3502; 3503; 3504; 3505; 3506; 3507; 3508; 3509; 3510; 3511; 3512; 3513; 3514; 3515; 3516; 3517; 3518; 3519; 3520; 3521; 3522; 3523; 3524; 3525; 3526; 3527; 3528; 3529; 3530; 3531; 3532; 3533; 3534; 3535; 3536; 3537; 3538; 3539; 3540; 3541; 3542; 3543; 3544; 3545; 3546; 3547; 3548; 3549; 3550; 3551; 3552; 3553; 3554; 3555; 3556; 3557; 3558; 3559; 3560; 3561; 3562; 3563; 3564; 3565; 3566; 3567; 3568; 3569; 3570; 3571; 3572; 3573; 3574; 3575; 3576; 3577; 3578; 3579; 3580; 3581; 3582; 3583; 3584; 3585; 3586; 3587; 3588; 3589; 3590; 3591; 3592; 3593; 3594; 3595; 3596; 3597; 3598; 3599; 3600; 3601; 3602; 3603; 3604; 3605; 3606; 3607; 3608; 3609; 3610; 3611; 3612; 3613; 3614; 3615; 3616; 3617; 3618; 3619; 3620; 3621; 3622; 3623; 3624; 3625; 3626; 3627; 3628; 3629; 3630; 3631; 3632; 3633; 3634; 3635; 3636; 3637; 3638; 3639; 3640; 3641; 3642; 3643; 3644; 3645; 3646; 3647; 3648; 3649; 3650; 3651; 3652; 3653; 3654; 3655; 3656; 3657; 3658; 3659; 3660; 3661; 3662; 3663; 3664; 3665; 3666; 3667; 3668; 3669; 3670; 3671; 3672; 3673; 3674; 3675; 3676; 3677; 3678; 3679; 3680; 3681; 3682; 3683; 3684; 3685; 3686; 3687; 3688; 3689; 3690; 3691; 3692; 3693; 3694; 3695; 3696; 3697; 3698; 3699; 3700; 3701; 3702; 3703; 3704; 3705; 3706; 3707; 3708; 3709; 3710; 3711; 3712; 3713; 3714; 3715; 3716; 3717; 3718; 3719; 3720; 3721; 3722; 3723; 3724; 3725; 3726; 3727; 3728; 3729; 3730; 3731; 3732; 3733; 3734; 3735; 3736; 3737; 3738; 3739; 3740; 3741; 3742; 3743; 3744; 3745; 3746; 3747; 3748; 3749; 3750; 3751; 3752; 3753; 3754; 3755; 3756; 3757; 3758; 3759; 3760; 3761; 3762; 3763; 3764; 3765; 3766; 3767; 3768; 3769; 3770; 3771; 3772; 3773; 3774; 3775; 3776; 3777; 3778; 3779; 3780; 3781; 3782; 3783; 3784; 3785; 3786; 3787; 3788; 3789; 3790; 3791; 3792; 3793; 3794; 3795; 3796; 3797; 3798; 3799; 3800; 3801; 3802; 3803; 3804; 3805; 3806; 3807; 3808; 3809; 3810; 3811; 3812; 3813; 3814; 3815; 3816; 3817; 3818; 3819; 3820; 3821; 3822; 3823; 3824; 3825; 3826; 3827; 3828; 3829; 3830; 3831; 3832; 3833; 3834; 3835; 3836; 3837; 3838; 3839; 3840; 3841; 3842; 3843; 3844; 3845; 3846; 3847; 3848; 3849; 3850; 3851; 3852; 3853; 3854; 3855; 3856; 3857; 3858; 3859; 3860; 3861; 3862; 3863; 3864; 3865



FEDERAZIONE NAZIONALE
IMPRESE ELETTROTECNICHE
ED ELETTRONICHE



Siamo davanti ad una scelta ...

