



TETRADYN

*Innovative Solutions for
Emergent Critical Processes in
Health, Energy and Security*

TETRADYN (TETRAD Dynamics)

Applied Science in Threat Protection, Monitoring
and Emergency Response Systems

25.July.2009
(Updated version available upon Request)



Copyright © 2009 TETRAD Dynamics and Martin J. Dudziak All Rights Reserved

Executive Summary

Need: How do decision makers get useful and timely data about the pathogens constantly attacking their constituents? How do they prevent such bio-threats from seriously disrupting their lives & the economy?

Solution: TETRADYN aims to be the leading-edge provider of bio-threat solutions. Using a combination of proprietary and 3rd party technologies, the Company offers tailored solutions to prevent, detect, monitor, analyze, and respond to bio-threats.

Features:

- Real time data (from detection through analysis)
- Predictive analytics to highlight possible events/results
- Easy adoption to tailored processes, software and equipment
- Integration with existing information systems



TETRADYN's Value Proposition - Overview

The TETRADYN process has a foundation in applied mathematics and MEMS-NEMS

•Intellectual Property that facilitates the Business Plan:

§Advanced Sensor Technology

- /// CUBIT® – fully integrated, comprehensive Bio-protection, analysis & notification-alert capabilities.
- /// CEBIT® – Sensor-based detection, analysis, and integration architecture;
- /// Nomad Eyes® – expands CEBIT® to include Situation Awareness and Response;

§Advanced Analytics, Forecast and Recognition

- /// ABORINT® – Mathematical Core Algorithms: the underlying analytics in TETRADYN's process.

•Linking Technology:

Deep technical understanding and evaluation of:

- § **Bio-pathogens, sensors, and communications;**
- § **Advanced analytical computer software;**
- § **MEMS, semiconductor/IC, embedded and wireless integration.**



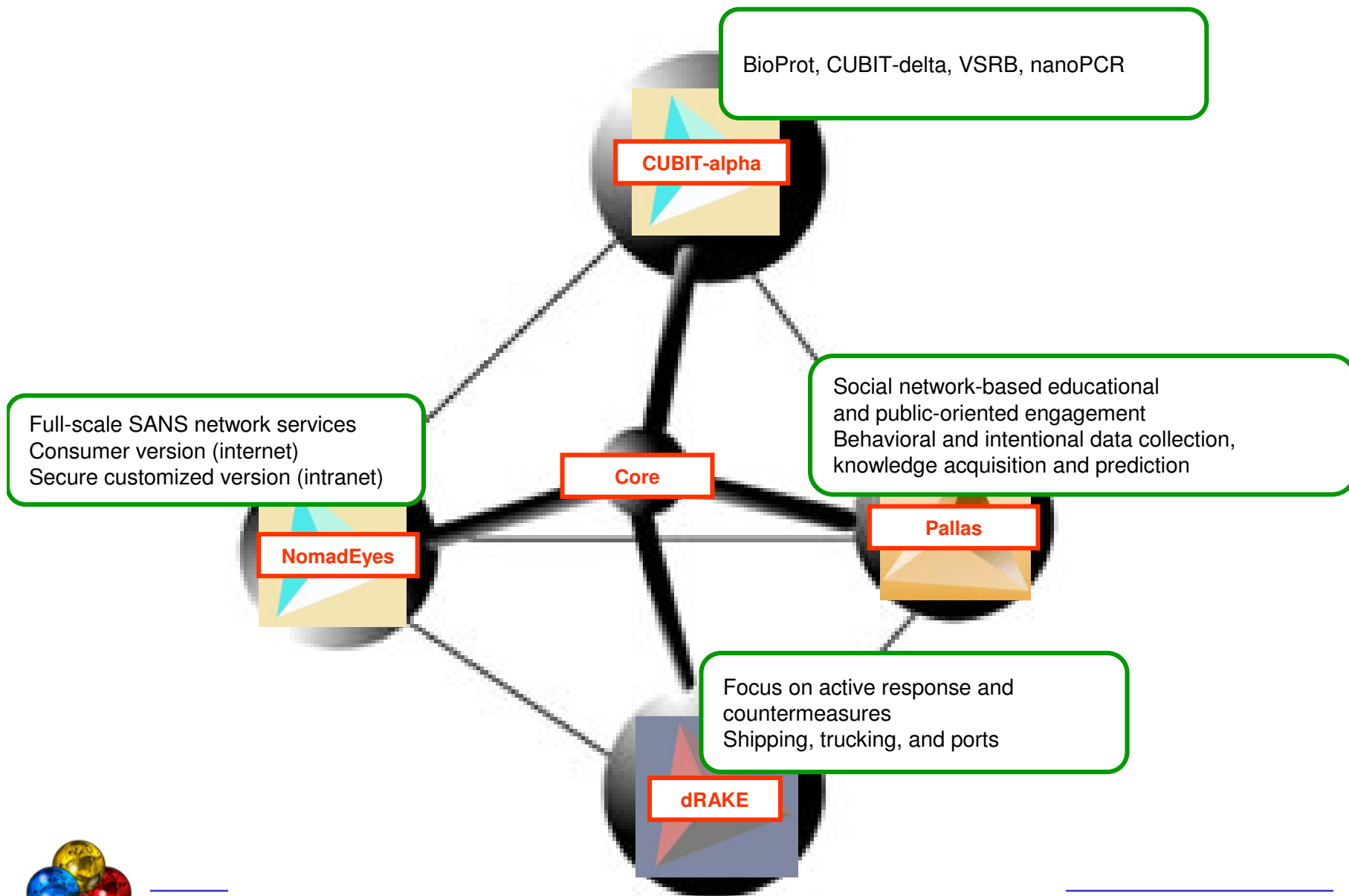
TETRADYN – Technology and Products (1 of 2)

Specifically, the integration of proprietary technology in gene sequencing, nanostructured materials in combination with nucleic acids, and algorithms incorporating inverse methods and nonlinear pattern recognition and anomaly detection, provides the ingredients for order-of-magnitude improvements in multiplexed real-time PCR and nano-PCR, resulting in faster and more accurate diagnostics, expansion of PCR beyond contemporary applications, and use of our base technology beyond medicinal and clinical applications, opening up markets in bioenergy, biofuel, and quantum/molecular computing.

This is the most central and focal dimension in TETRADYN. The mathematical and biophysical foundations give rise to and/or complement the other components of what we have developed and are delivering.



TETRADYN business divisions organizational and functional model



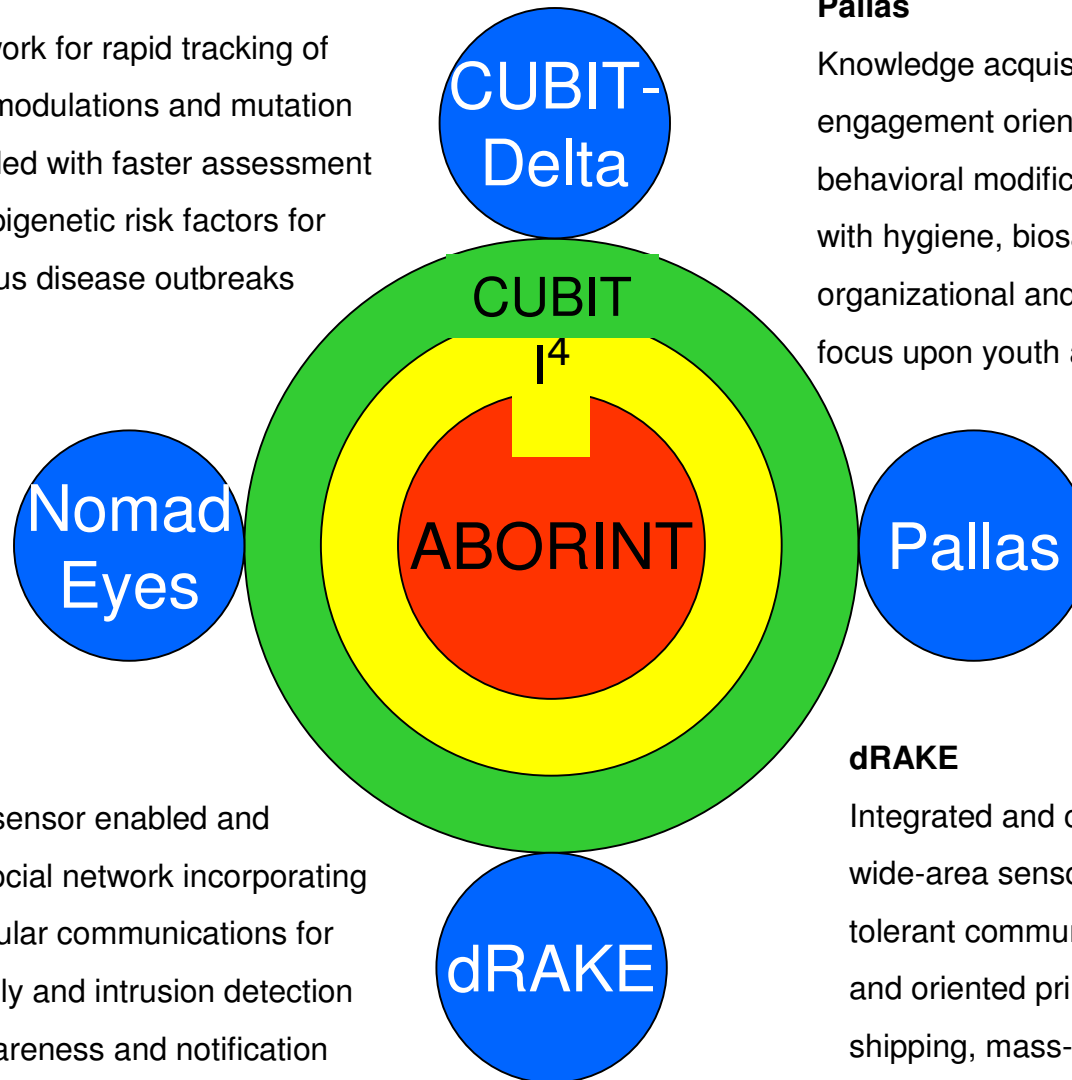
TETRADYN – Technology and Products (2 of 2)

CUBIT-Delta

PCR-based network for rapid tracking of gene sequence modulations and mutation forecasting coupled with faster assessment of genetic and epigenetic risk factors for common infectious disease outbreaks

Pallas

Knowledge acquisition, dissemination and engagement oriented to training and behavioral modification objectives linked with hygiene, biosafety, ICLH and CBRNE organizational and public safety including focus upon youth and at-risk groups



Nomad Eyes

Data collection (sensor enabled and capable) open social network incorporating wireless and cellular communications for life-threat anomaly and intrusion detection and situation awareness and notification

dRAKE

Integrated and customizable installation of wide-area sensor networks with fault-tolerant community response resources and oriented principally to ocean-going shipping, mass-transit, and trucking fleet applications



TETRADYN's Integrated Framework

TETRADYN views & provides Bio-Threats solutions within an Integrated Framework

Pre-emptive Solutions:

- Provides assurance that Companies have proactively considered and acted to reduce environmental exposure to known pathogens, such as MRSA, Legionella pneumophila (Legionnaire's Disease), Salmonella, and *e. coli*);
- Provides effective control, as well as documented history of Risk Management abatement and staff training, utilizing EPA-approved materials;
- Ensures that knowledgeable professionals, with the appropriate technical expertise have evaluated and mitigated potential risks.

Monitoring:

- TETRADYN can deploy on-line, real-time, world-wide (if appropriate) sensing and centralized reception and information distribution of pathogen status

Emergency Response:

- Should an outbreak occur in an un-protected area (Manufacturing Facility, Office Complex, Confined Space), TETRADYN can deploy a mobile Command Center equipped for situation-specific Bio-Threat monitoring and containment.



TETRADYN's Integrated Framework Solutions

Pre-emptive: **BioProt®**

- Anti-microbial protection via surface application validated and in limited-domain applications;
 - Effective against:
 - Bacteria [such as Legionella pneumophila (Legionnaire's Disease), and e. coli],
 - Viruses [such as Rotavirus (common cold) viruses],
 - Molds
- Status: Available for wide-scale applications

Monitoring:

- **Nomad Eyes®**
 - Sensor-based communications analysis network for large public or confined spaces;
 - Capable of real-time or periodic upper-lower limit trend management, as appropriate;
 - Exceeds DHS (Dept. - Homeland Security) and EPA requirements;
 - Includes on-site monitoring & communications to central receiver (via wireless, with GPS and GIS capability).
- **CEBIT®**
 - Family of Re-configurable , Re-usable MEMS (Micro-mechanical Systems) for Detection & Control of Bio-Threat-based Pathogens

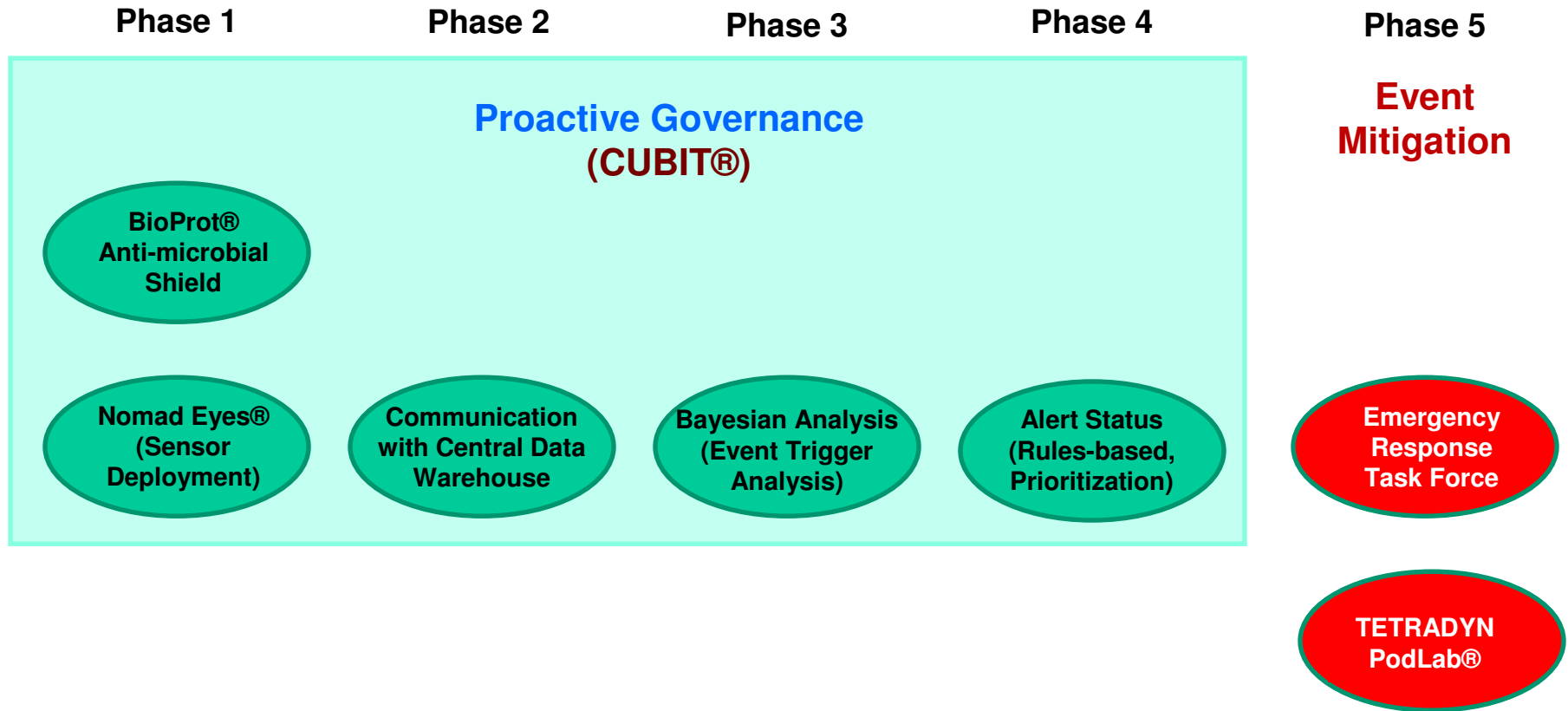
Emergency Response: **CUBIT®**

- Coordinated Unified Bio-Threat Intervention & Treatment
- Integrates All Bio-Threat Technologies into a single, situation-specific mobile Command Center



Applied Technology – Framework Overview

TETRADYN's Deep, Integrated Technology mitigates the Bio-Threat Hazard



TETRADYN – Pre-emptive Bio-Threat & Risk Management

Risk Management is an emerging imperative within both Statutory Reporting and Corporate Governance: a natural extension of the Sarbanes –Oxley umbrella and Worker Health & Wellness programs;

- **Recent Headline Precursors include:**
 - **Long-term Exposure Pathogens:**
 - **Mesothelioma (Asbestos: Construction, Public Exposure);**
 - **Black Lung (Mining); and Silicosis (Manufacturing)**
 - **Short-term Pathogens:**
 - **Anthrax; Legionnaire’s Disease; Listeria; and, Salmonella (to name a few)**
- **Lack of Prevention has led to Extraordinary Financial Exposure for some companies, and outright bankruptcies for others (W. R. Grace, Johns Mansville)**

TETRADYN’s system provides the hard-documentation and proof of Management’s Proactive consideration of probable risks, and risk mitigation, ahead of Bio-Threat occurrence.



TETRADYN – Bio-Threat Pre-emptive Mitigation

Pre-emptive: **BioProt®**

- Anti-microbial protection via surface application validated and in limited-domain applications;
 - Effective against:
 - Bacteria [such as Legionella pneumophila (Legionnaire's Disease), and e. coli],
 - Viruses [such as Rotavirus (common cold) viruses],
 - Molds
- Status: Available for wide-scale applications



TETRADYN: CUBIT Transition Plan

CUBIT builds upon existing data collection and analysis networks and does not depend upon nor require specific new devices or protocols

- **Integrate Sensor, Analysis, Diagnose/Protect Networks**
 - Coordination of multiple existing systems and organizations
 - Develop Testing+Validation Plan Based Upon Existing Infrastructures

- **Intelligent Coordination (Feedback, Control, Response)**
 - Verona + CMDRS – Agent-enabled, multimedia, portal (CMS, GIS)
 - EMPIRES architecture – integrating alerts and enhanced observation

- **Prepare packaged CONOPS+resources+tools for local/regional entities**
 - To: state, county, local departments
 - Through: DHS, CDC, DOI
 - Similar vehicles as for First Responder, Critical Infrastructure programs
 - “Translation package” making technology usable in agriculture, forestry, public health and safety, forensic operations



TETRADYN deploys Deep, Integrated Technology
to mitigate the Bio-Threat Hazard;



The following slides provide the next layer of insight into **TETRADYN's**
comprehensive program;

1. Sensors used in **Nomad Eyes®**, **CUBIT®**, and related ECP* solutions
2. **BioProt** – the surface protection dimension and chemistry;
3. The informatics dimension
4. **PodLab** – the Mobile Command Center (EcOasis, EcoSense, CRAIDO versions)

*ECP:

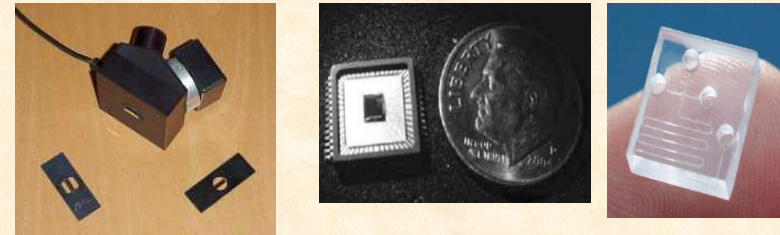


Applied Technology – MEMS Sensors

MEMS Sensors

- Polymer LBL Nanofilms
- Piezoresistive Microcantilevers
- Remote Optical Waveguide
- MODE magneto-optic detection

MEMS (Micro-Electro-Mechanical-Systems, Nano Technology)



- Deployed within Situation Awareness and Communications Solutions (SACS)

Integrated Solutions

- CUBIT™ – Prevention to Response for Public Biothreats
- Nomad Eyes™ - Stochastically Distributed Wireless



MEMS Technology ensures:

- On-site Leading-edge technology;
- Unobtrusive Surveillance & Monitoring;
- Compact, Low Power, Upgradeable, Plug & Play, and Platform-independent;
- Remote re-configurability for periodic Upgrades & monitoring of the device, itself;
- Compatibility with Off-the-shelf wireline & wireless data transmission protocols (Bluetooth, RS 232, ...)



Applied Technology – MEMS Sensors

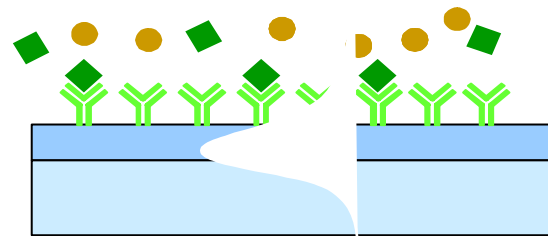
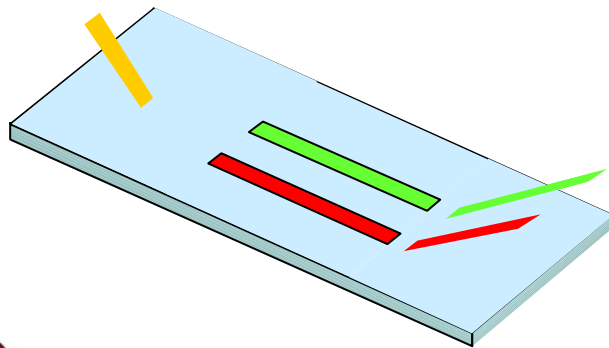
Bio-Detection

Method

- » Detection is determined by monitoring an interferometric phase change over a time interval;
- » Phase change is directly proportional to analyte concentration

Capabilities

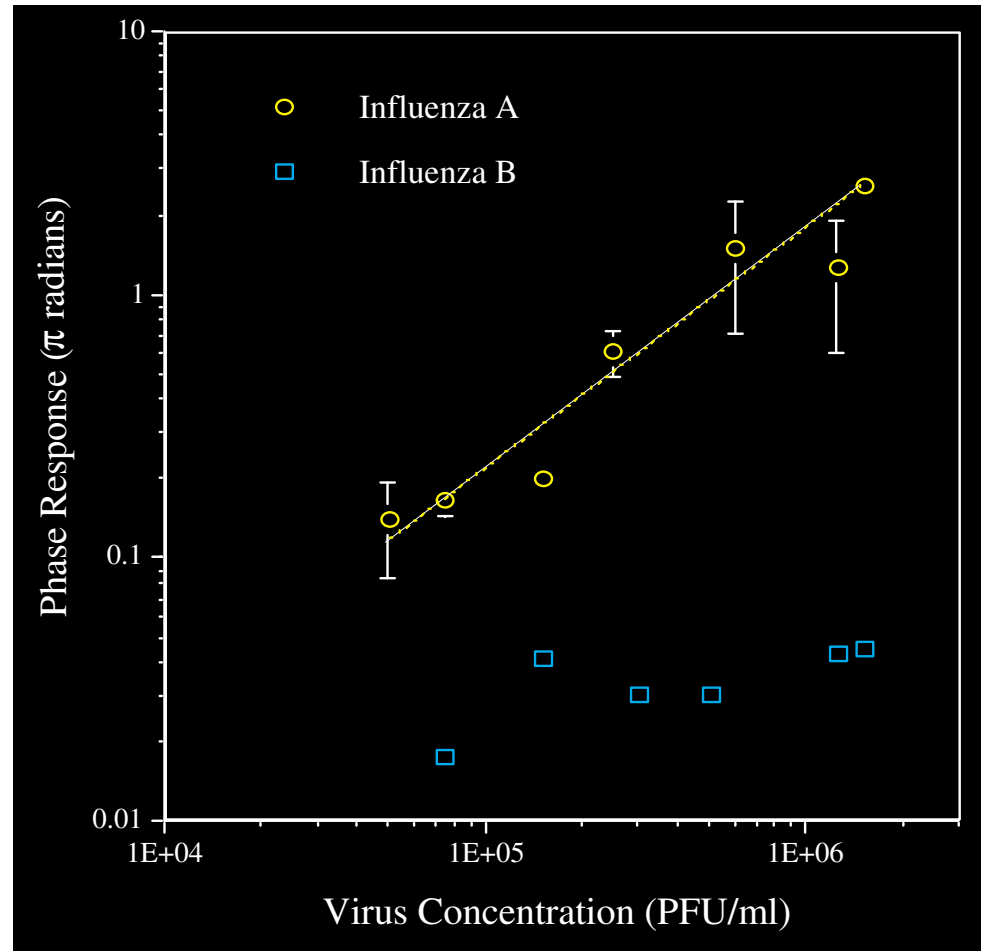
- » Compatible with the use of all types of surface-immobilized receptors, such as antibodies, nucleic acid probes, and aptamers
- » Demonstrated detection of nucleic acids, proteins, viruses, and bacteria



Applied Technology – MEMS Sensors

Rapid Pathogen Detection

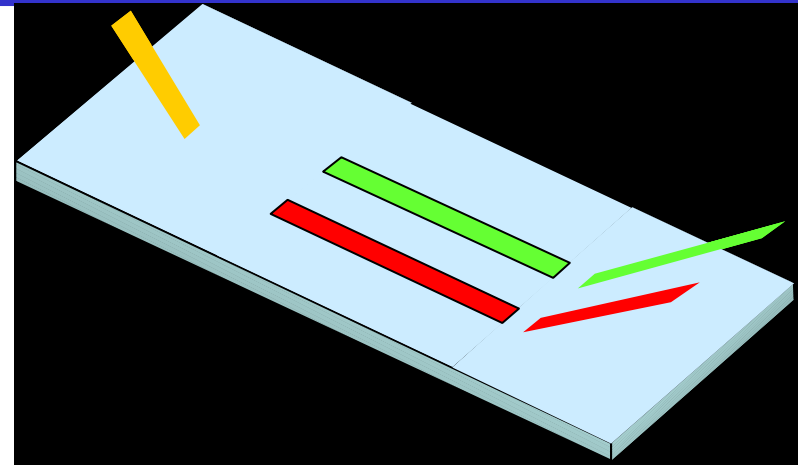
- Sensor is capable of the rapid immunoassay detection of a range of viral and bacterial pathogens
- The Chart shows 15 minute signal for different concentrations of influenza A and influenza B using a sensor with immobilized antibody against influenza A nucleocapsid protein.



Applied Technology – MEMS Sensors

Key Technology Features

- Refractometric detection allows the real-time measurement of the binding of biological and chemical species to the optical chip surface



As a result, the sensor provides for:

- Kinetic binding measurements
- Inherently quantitative measurements
- Highly sensitive measurements, with on-chip detection of picogram amounts.
- Simple assay formats that do not require wash, separation of label read-out steps
- One-step sandwich assays, include enhanced sensitivity using high refractive index gold nanoparticle tags
- Multi-analyte detection



Applied Technology – Anti-Microbial Chemistry

TETRADYN's Anti-Microbial Monomer/Polymer

Offers Cleaner, Faster, Safer, More Comprehensive Anti-Microbial Protection



- FDA Approved for Food-contact; not a serious toxin, nor dangerous like Triclosan;
- Less Expensive, Faster-Acting, & Longer-lasting;
 - Than silver/copper-based compounds
- Non-leaching: stays within the material;
- Extends functional life of product treated;
- Produces self sanitizing materials;
- Can be applied as spray, in solution, or as powder.



Applied Technology – Anti-Microbial Chemistry

Typical Applications

- **Individual and collective protection**
 - Clothing, Uniforms, and other Wearable Fabrics
 - Carbon filters
 - Tent Webbing and canvas materials
 - Painted Surfaces
 - Laminate and counter tops in field operations
- **Contamination avoidance**
 - Bulk polymer Resins/ Plastics
 - Resin Concentrates
 - Sanitation and Health Safety Equipment
- **Medical treatment**
 - Medical Devices
 - Surgical drapes and wound dressings
- **Nano coatings**
 - Interior surfaces/ walls floors
 - HVAC ducts
 - Filters



Applied Science in BioThreat Protection, Monitoring, and Emergency Response Systems - Addressing Emergent Critical Processes (ECP)

- Provides a Pro-active Framework, for a comprehensive Ahead-of-Threat solution;
- Provides a broader Framework for Environmental Governance, within defined areas of control and responsibility;
- Provides Companies seeking to be **Environmentally-Green** with the next-level solution; that also protects workers and the Attending Public



CUBIT, CUBIT-Delta and VSRB

Introduction

CUBIT refers to an open architecture for biothreat identification, intervention and treatment protocols that incorporate sensors, diagnostics (particularly real-time PCR based methods and also immunoassay first-level monitoring), and informatics that includes both situation assessment and notification as well as public educational engagement and training.

CUBIT-Delta is a proposed program of clinical and research activity to be coordinated and managed by TETRADYN and conducted within a network of collaborative investigators and institutions specializing in the diagnosis and treatment of infectious diseases, and in particular influenza.

The program may be described in one sentence:

Rapid and more timely tracking of trends in known and projected new variations of infectious diseases that are emerging or spreading at epidemic rates through identified populations and regions, with an aim to accelerate knowledge, focus of attention, and provision of resources among genetic researchers, vaccine developers, pharmacological developers, and public health agencies in order to circumvent the rise of more virulent and infectious forms of a given disease into pandemic and lethal forms.

VSRB = Virtual Sample Repository Bank. This refers to a derivative of CUBIT-Delta that is focused upon the tracking and dissemination of information pertaining to the location, conditions, availability and dispositions of selective patient samples of high-probability infectious disease agents (e.g., HxNy influenza).

An accompanying formal R1-format proposal document is in the process of being prepared and this will be based upon the refinement of what is contained within this document. This formal proposal will include:

- technical backgrounds and foundations for the proposed research and clinical methods, instrumentation, laboratory protocols, mathematical models, algorithms, software and information distribution;
- prior research and justification for CUBIT-Delta;
- detailed technical research plan, objectives, milestones and schedules;
- detailed budgets for Phase 1 and Phase 2;
- technical and professional backgrounds of all proposed core team members (TETRADYN and others), collaborators, consultants, and reviewers



CUBIT Systemic View

The diagram on this page refers to a prior (prototype) architecture designed for the deployment and management of rapid-response units in situations of suspected outbreaks of high-contagion-risk infectious diseases.

CUBIT Designer Process Map

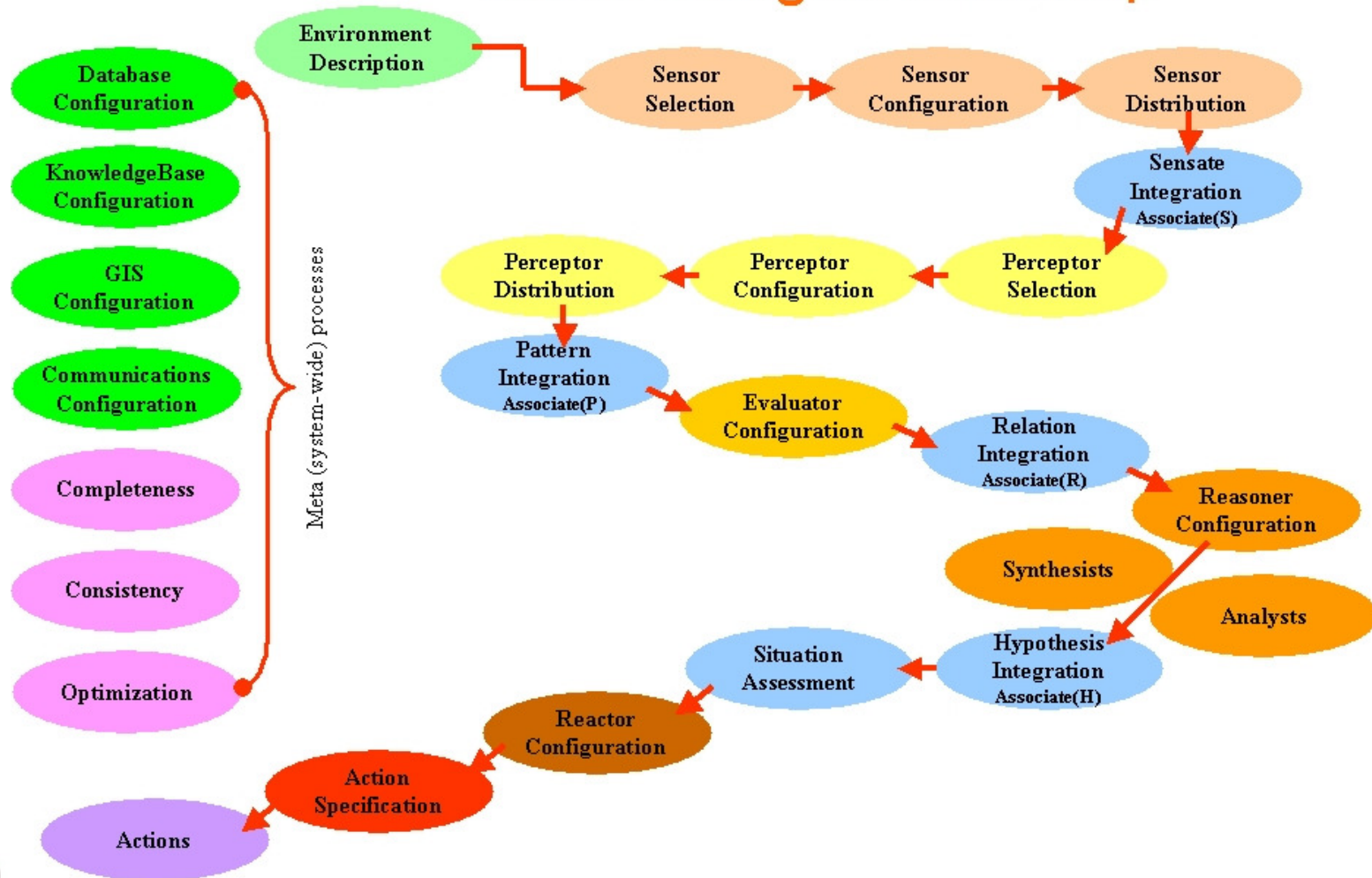




Figure 2.1 – Proposed Phase 1 and Phase 2 CUBIT-Delta Nodes in North America

(note that (1) includes the main and first hub (Vanderbilt) and, along with the MX node, extending from Phase



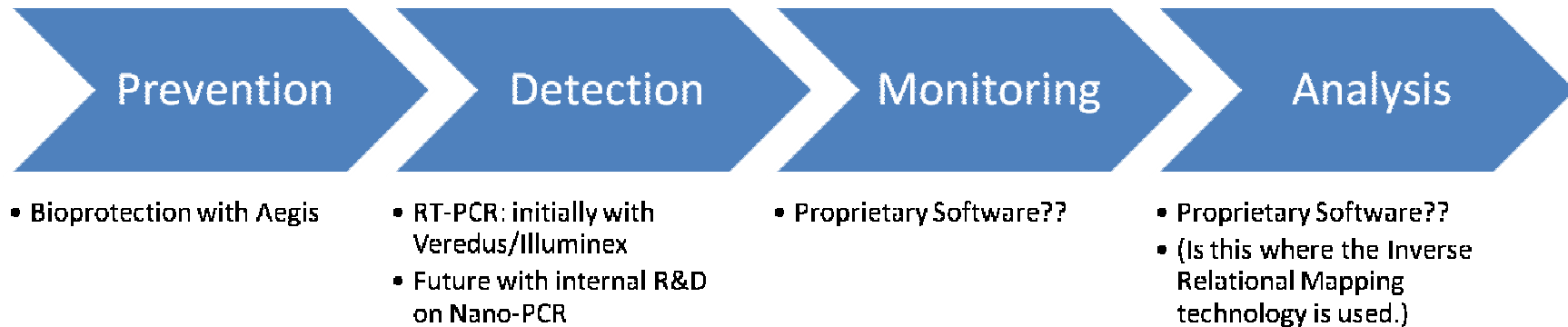


Figure 2.2 – Proposed Phase 2 CUBIT-Delta Nodes outside US-CA-MX



CUBIT's Value Proposition

(essentially: to provide solutions to bio-threats)



TETRADYN – Distinctions and Discriminations

TETRADYN is apart and unique from other companies in the business space of biotech, genetic engineering, PCR, medical diagnostics, and CBRNE countermeasures for several reasons.

A major distinction is that of the company's strict adherence to practicing the **ACCORD principle – Accurate, Consistent, Coherent, On-Time, Reliable, Defensible in all its work and production.**

A second major distinction is in the composition and requirements for its employees. Each employee is validated to be of high character and ability in not only technical competencies but in communication, interpersonal, and business development.

For this reason, TETRADYN will not bring to its investors or employees, nor to its business community, the risks of companies that have faced problems extraordinaire. TETRADYN offers the wise investor Peace of Mind with respect to many challenging risks that face all businesses large and small.



TETRADYN (TETRAD Dynamics) – Contact Information

Principal Contacts for the Company

Martin Dudziak

martinjd@tetradyn.com

(202) 415-7295

(757) 847-5511

(804) 740-0342

Offices:

Richmond, VA

Mailing Address: 28 Chase Gayton Circle, Suite 731, Richmond, Virginia 23238-6533



Relevant URLs

<http://tetradyn.com>
<http://podlab.tetradyn.com>
<http://nomadeyes.com>
<http://chips.tetradyn.net>
http://tetradyn.com/v01_site
(older, with some ref to non-focal products/tech)

<http://instinnovstudy.org>



