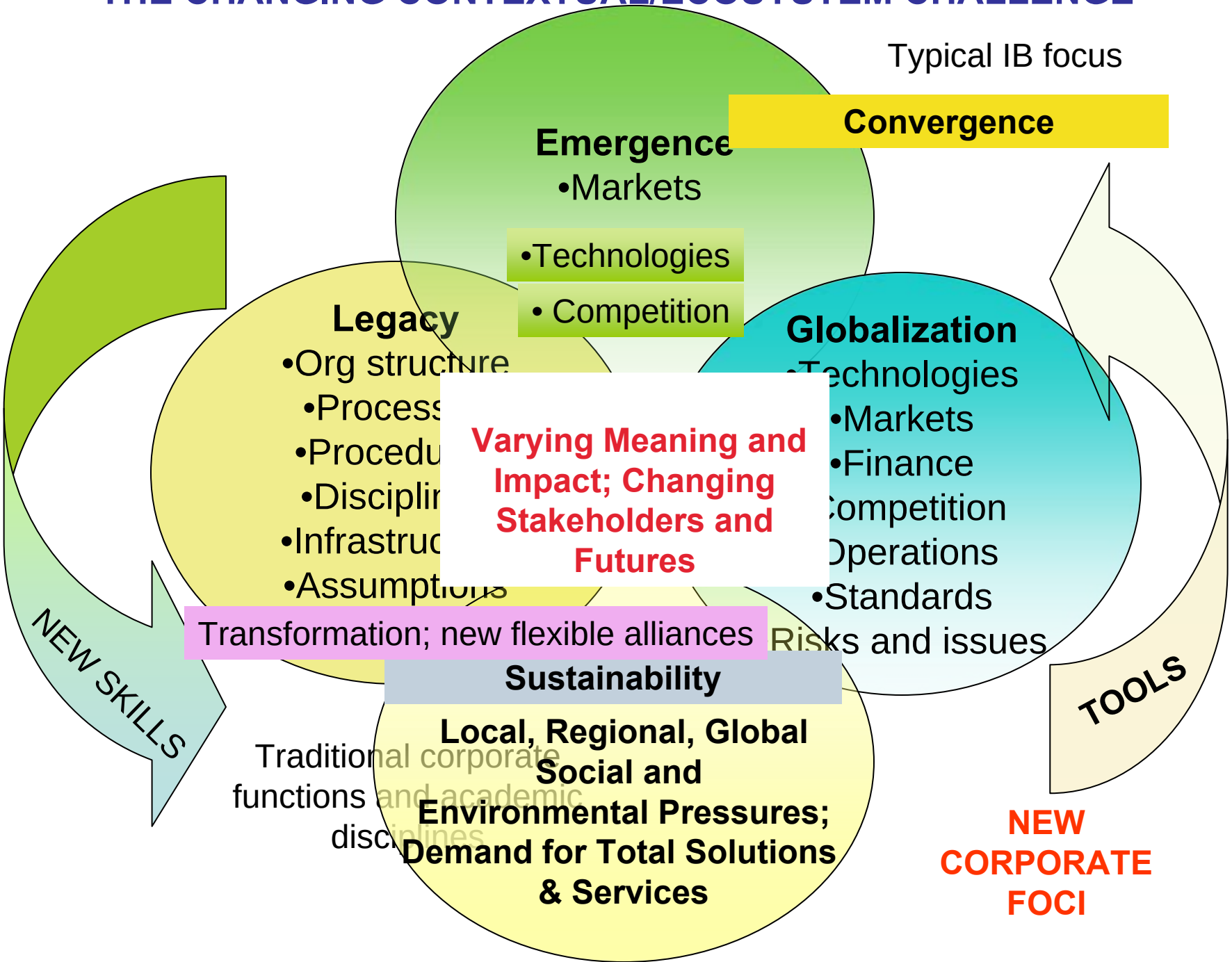
What is happening in the world?

- security threats of new types and from new and unexpected sources
- emerging and *converging* science-based technologies that cross traditional disciplines
- information overload
- globalization; multi-polarity
- “VUCA” conditions

Volatile Uncertain Complex and Ambiguous

THE CHANGING CONTEXTUAL/ECOSYSTEM CHALLENGE



Needed skills and teaching / learning challenges

- Tolerate ambiguity and adjust to continual change
- Quickly assess underlying drivers and roots
- Deep sensitivity to critical contexts
- Recognize new and evolving interrelationships and assess implications
- Recognize and assess full range of stakeholders – current and potential
- Recognize and evaluate legacies and personal, organizational and national biases
- Identify and challenge assumptions
- Specify critical tasks and requirements
- Bridge, benefit from, and integrate disparate disciplines and perspectives
- Innovate under VUCA conditions
- Apply tools primarily evolving in the corporate domain to deal with these conditions

These skills are not generally being taught.

Can they be taught with current text books or cases and by currently trained instructors?

In which teaching contexts and at what levels can these best be taught?

What are long term but also interim measures/indicators that they are being conveyed?

So we need:

- **new teaching approaches**
- **new integration of teaching skills and planning across educational levels**
- **new true cross-disciplinary and cross-context courses**
- **new relationships between universities, industry and community**

Some University-Industry Partnership Model Mechanisms

- **GATIC**

A self-financed consortium of a dozen universities (including ETH Zurich, Northwestern University, the Japan Advanced Institute of Science and Technology, the University of Cambridge) and over 120 collaborating large and start-up firms worldwide.

- **Industry-academic task forces**

- **Virtual global student project teams**

INDUSTRY DERIVED TOOLS

Domain mapping to help identify and achieve consensus on where the organization or operation should go and to sketch out possible migration paths and interim milestones;

Mind mapping to encourage identification of new options and potential threats, highlight evolving interrelationships and capture and assess disparate views;

Scenario planning (an older tool newly applied) to build and challenge the robustness of strategies under varying possible conditions;

Corporate product/technology roadmapping to lay out tasks, potential obstacles and resources requirements over time to reach a goal;

Underlying requirements, cascading impact, critical points/root cause (UCCP) analysis applied to observed conditions and strategic options to assess key underlying issues, downstream effects and trade-offs.

NU simulations (sequence of 5 with increasing complexity)

In test use by 25 US business schools and a number of companies, they vary in industry, region, issue focus but all:

- push students to recognize and consider subtle, complex, underlying issues, trade-offs and interdependent factors
- require students to:
    - view situations from multiple stakeholder perspectives
    - assess critical company, country factors/drivers and constraints as well as external developments (competitor actions, technology developments, changes in markets, conflicting corporate demands, regional developments)
    - develop specific recommendations with uneven information and anticipating changes; develop and analyze scenarios
    - respond to “updates” that may challenge assumptions and require adjustments in planning
- are modular and flexible for use in different courses
- were developed in partnership with industry and apply industry tools

SUSTAINABLE INNOVATION COURSE MODEL ANALYTIC FRAMEWORK

Futures and Legacies
Organizational
Regulatory
Environmental
Societal; stakeholders
Technological
?

Drivers
Constraints
Flags
Assumptions

Tasks
Timing
Order

analysis ⟷ *synthesis* ⟷ *implementation*

Dynamic, iterative

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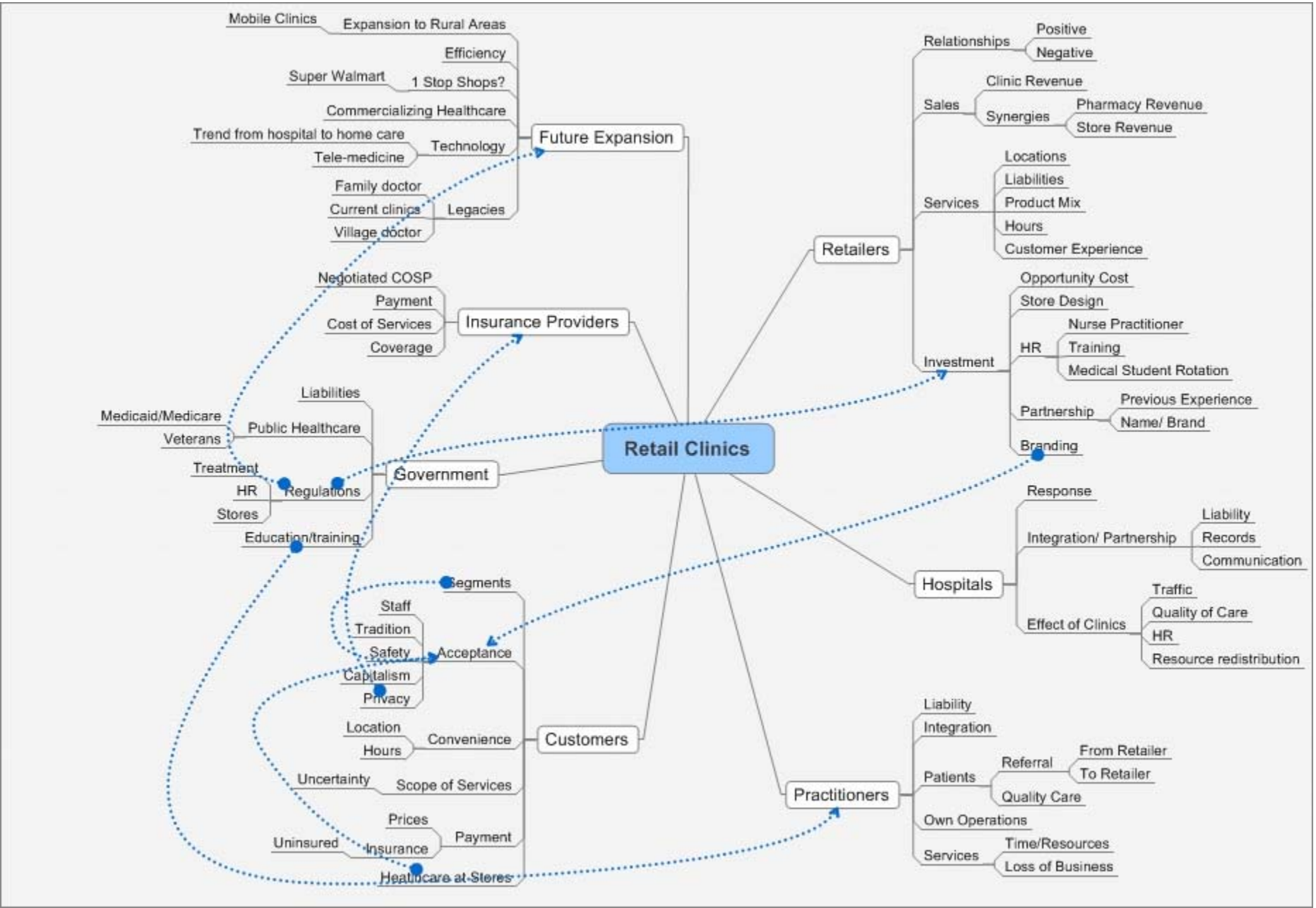
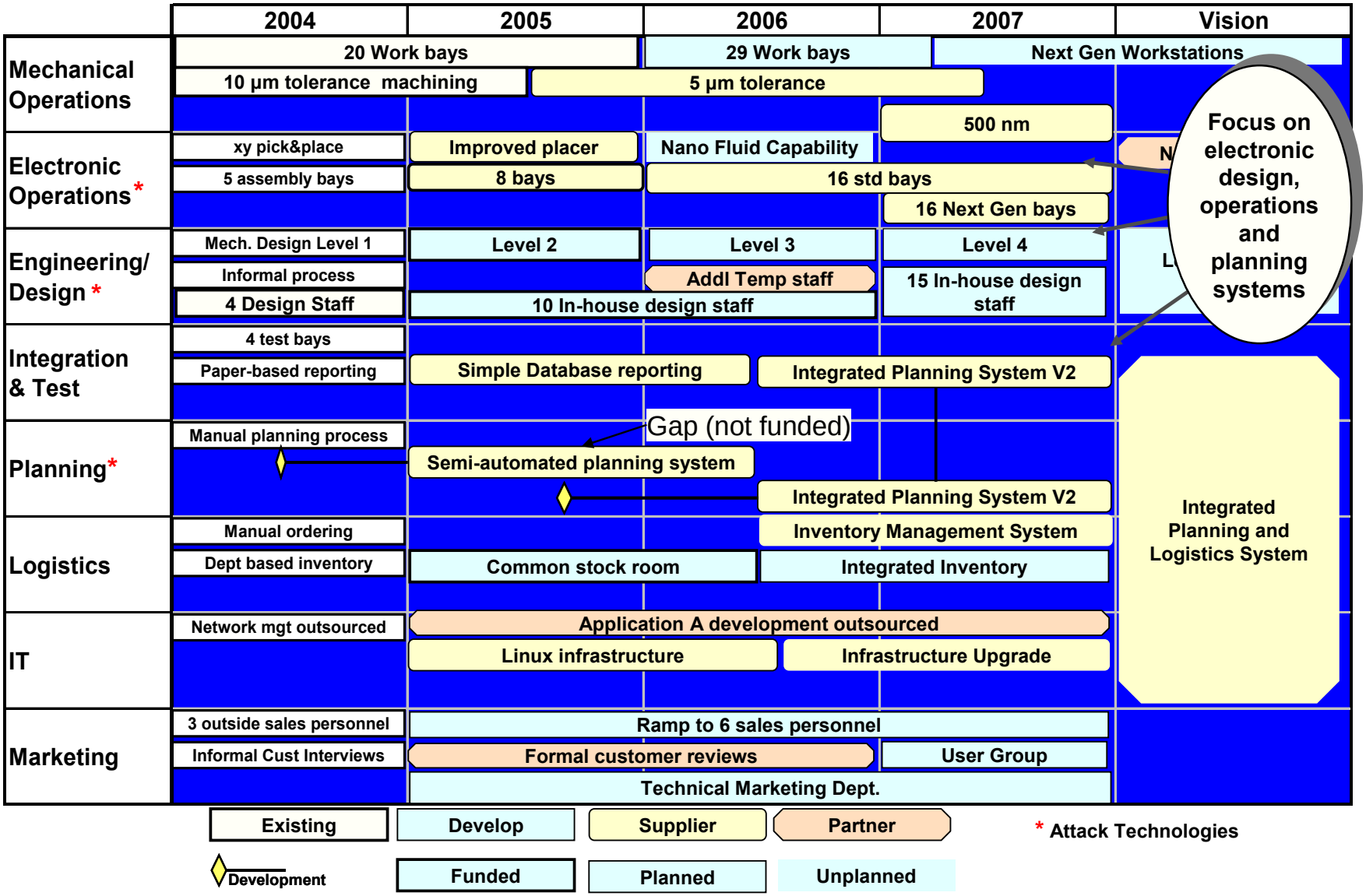
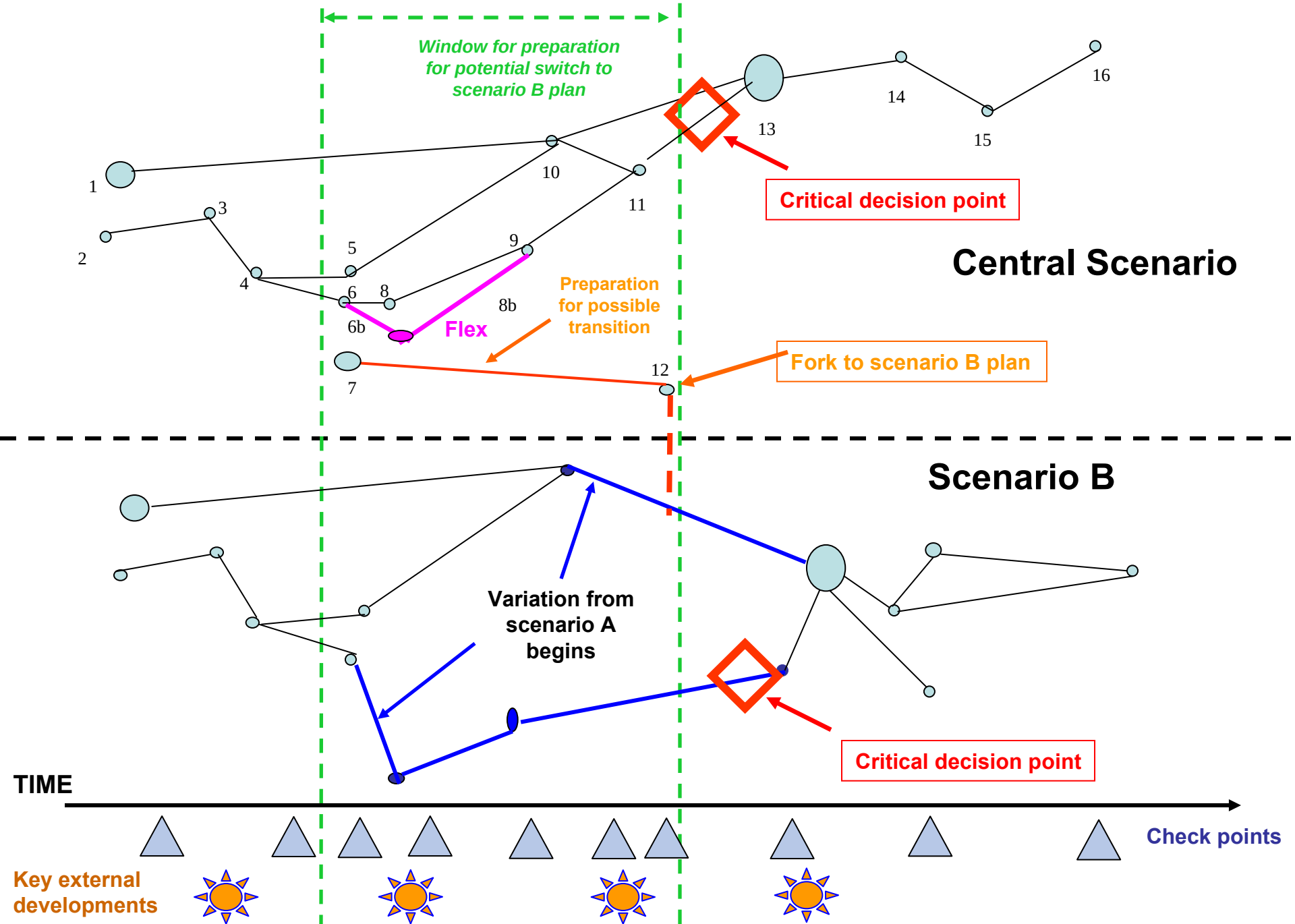
Mindmapping example



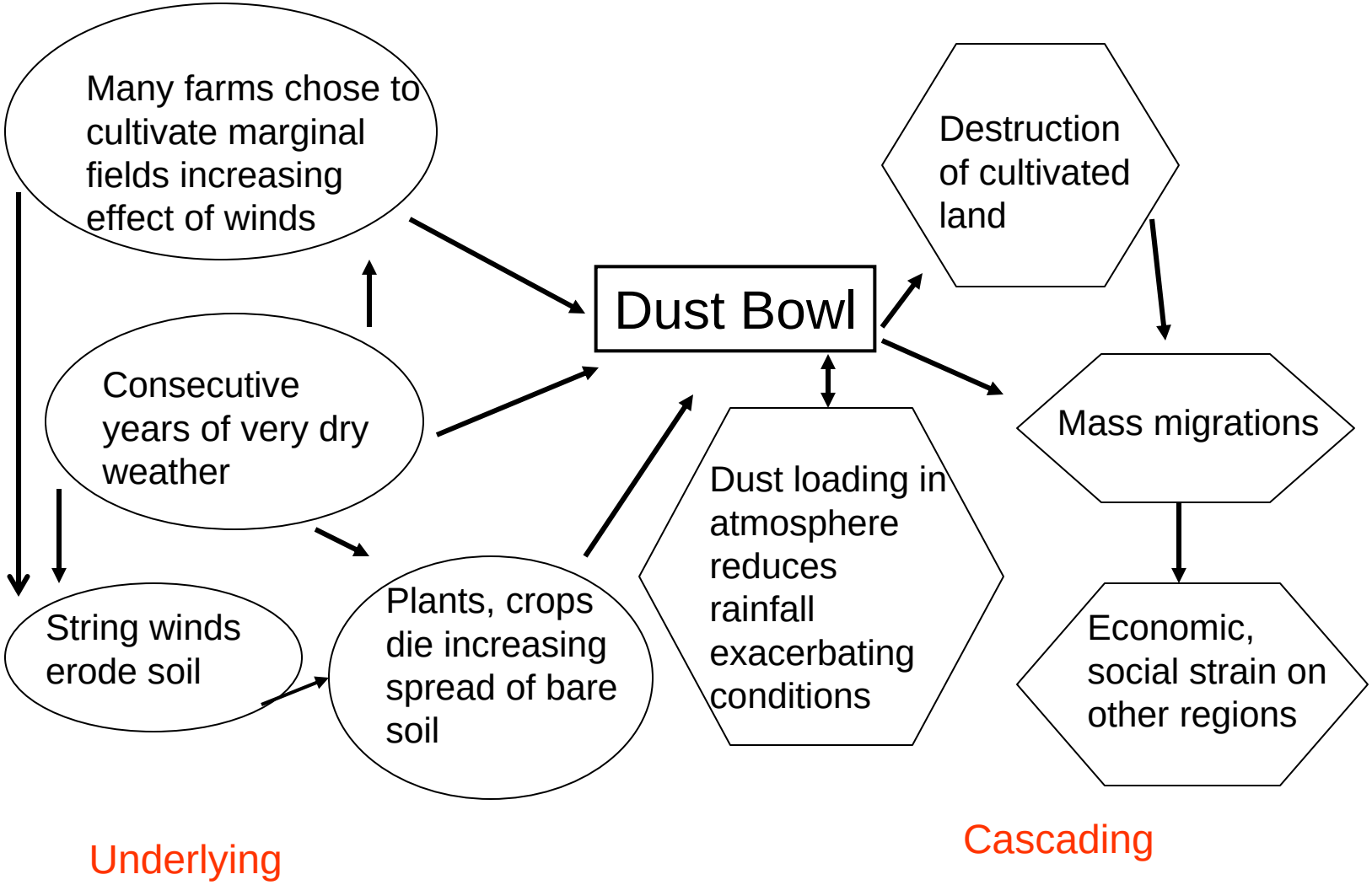
Capability/Technology Roadmap



Multi-scenario taskmap pert chart illustration



1930's (US) Dust Bowl UCCP Example



So how can these issues be conveyed and needed skills taught?

Lectures

Cases

- Standard
- “Layered”/”discovery”
- “Cascading”

Field studies

Interactive simulation

Practicum

Internships (varied)

Other? Living history; preparation, sequence

SUSTAINABILITY DEFINED

Ensuring long-term business success while contributing towards intergenerational sustainable economic and social development – i.e., meeting current needs without compromising future generations.

Beyond the common focus on corporate social responsibility (CSR) and environmental (green) concerns, sustainability and ***sustainable innovation*** requires **broadening** perspective on relevant stakeholders and key relationships, **deepening** attention to underlying drivers and evolving economic, market, competitive and technological factors, and **lengthening** planning time horizons.

(These requirements are the focus of this overall presentation.)

Summary of CTIM simulations

Company	**Industry/ product**	**Target country/region**	**Issues/trade-offs**
NuGro	Agricultural chemicals	Ginko (undefined region)	Legacy, cultural factors; conflict between pro-industry and pro-ag movements
Stopsem	Security systems	South Africa	(in addition to emerging economy conditions including gaps and unevenness in infrastructure and development, limited/misleading data) • economic and political direction and stability , • apartheid legacy, • limited government published scenarios provided; • issues of policy, development sustainability
Henzger	Baby food	Cheroca (Eastern Europe)	(in addition to emerg.econ conditions) Legacy of central control <u>Trade-offs in partner selection:</u> • location • local, national gov. connection • image • control/ flexibility • complementary resources; mgmt/labor capacities • required level of investment, start up time • compatibility with products and processes • familiarity, comfort

Summary of CTIM simulations (continued)

Company	Product	Region	Issues/trade-offs
NuCom	Telecom, cellular	Nueva Esperanza (Central America)	(in addition to basic EE factors) • technology and standards evolution (local, regional, global) • global economic, political developments • corporate internal resource allocation decisions • privatization schemes • legacy of military control
NuSensor (part 1)	Automotive sensors, maybe moving into telematics, ESC	Pendin Mai (Southeast Asia)	(in addition to emerg. econ conditions, global economic and political conditions) • automotive supply chain/industry structure changes (supplier perspective) • uncertain technology and market evolution; technology requirements crossing traditional disciplines, sectors • regional political, economic, policy issues; continuing uncertainty and ramifications from currency crisis • Trade-offs (in addition to Henzger issues except location) support for technology evolution and global position
NuSensor (part 2)		Global?	Transformation: global, technology, tier positioning and related organization and product/service mix in face of changes and uncertainty going forward

Tool integration: Risk Management example

RISK MANAGEMENT REQUIREMENTS	TOOL/PROCESS SUPPORT
Understanding changing relationships between fields and functions	• Mindmapping
Timely recognition and anticipation of new sources of opportunities and threats including encroaching technologies from other industries; emerging stakeholders	• Mindmapping • Roadmpping (multi-scenario taskmapping if warranted by the operations scale & volatility) • Portfolio management
Sophisticated understanding of operations, the interrelationship of tasks and risk factors, where the organization is vulnerable to change and how change would impact	• Mindmapping • Scenario planning • Roadmpping (multi-scenario taskmapping if warranted)
Critique of corporate mission and the fit of org. goals with emerging conditions	• Scenario planning • Portfolio management
Development of plan and processes to define and monitor change indicators	• Scenario planning
Appropriate communication of above to multiple organization levels, potentially including suppliers, customers; Integration into general planning; preparation for possible changes and crises	• All (integrated)