Technology Roadmaps
What Value for PSMC?

LMI
PSMC – Mesa, AZ
Dec 3-6, 2013

The Purpose of Technology Roadmapping

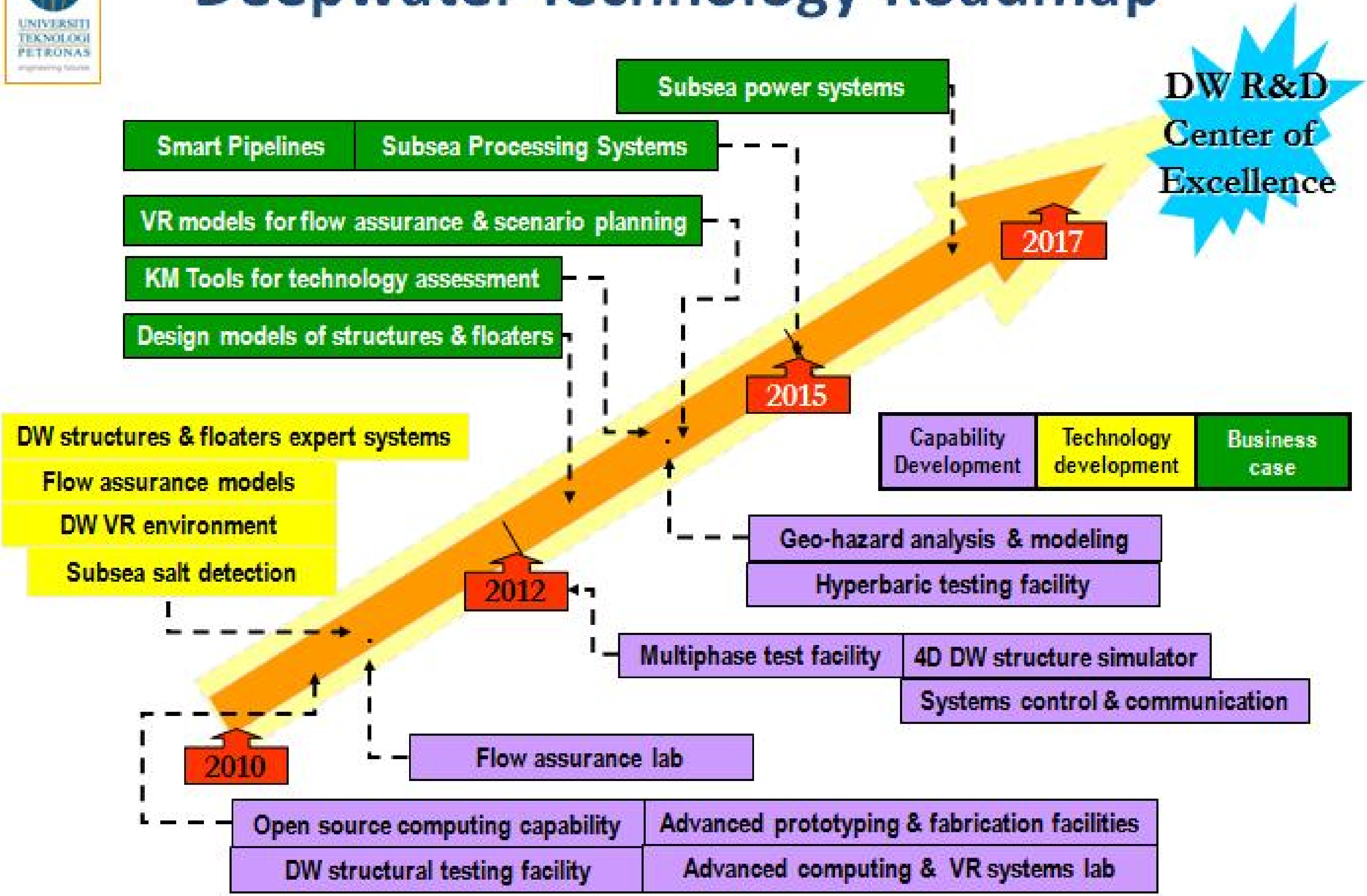
- Product planning
  - This is the most common type of a technology roadmap; linking the insertion of technologies into products.
- Program planning
  - This type is more directed to the implementation of strategy and related to project planning.

Technology Roadmap

- A plan that matches goals with specific technology solutions.
- Applies to a new product, process, or emerging technology.
- Helps reach a consensus about needs and the technologies required to satisfy those needs.
- Provides a mechanism to forecast technology developments and provides a framework to plan and coordinate technology developments.

UNIVERSITI TEKNOLOGI PETRONAS

Deepwater Technology Roadmap



DW R&D Center of Excellence

2010

2012

2015

2017

Subsea power systems

Smart Pipelines

Subsea Processing Systems

VR models for flow assurance & scenario planning

KM Tools for technology assessment

Design models of structures & floaters

DW structures & floaters expert systems

Flow assurance models

DW VR environment

Subsea salt detection

Capability Development

Technology development

Business case

Geo-hazard analysis & modeling

Hyperbaric testing facility

Multiphase test facility

4D DW structure simulator

Systems control & communication

Flow assurance lab

Open source computing capability

Advanced prototyping & fabrication facilities

DW structural testing facility

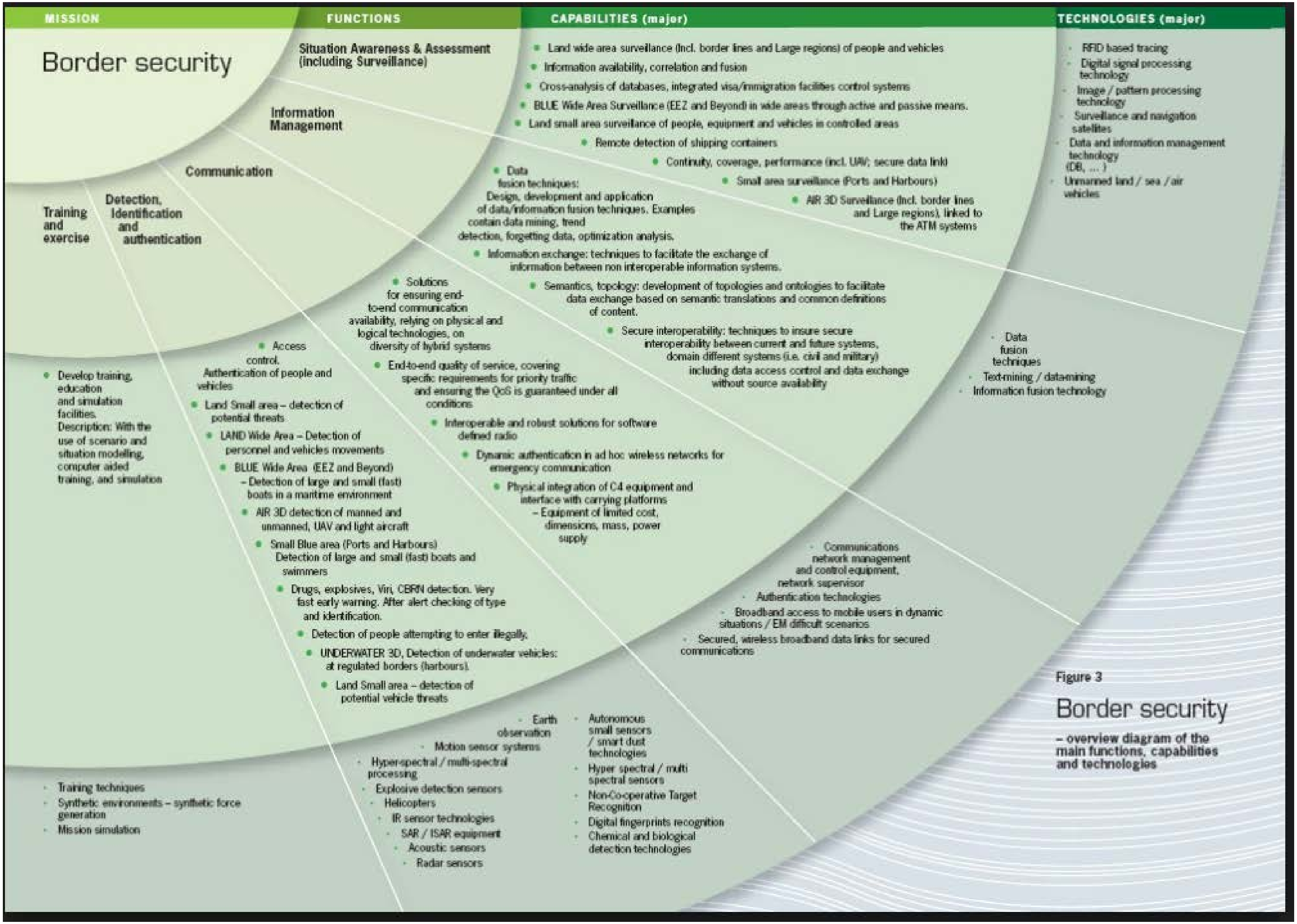
Advanced computing & VR systems lab

Process

Technology roadmapping fits into corporate strategic planning, technology planning, and business development.

Three critical elements should be connected:

- needs,
- products
- technology.



MISSION | **FUNCTIONS** | **CAPABILITIES (major)** | **TECHNOLOGIES (major)**

Border security

Situation Awareness & Assessment (including Surveillance)

- Land wide area surveillance (Incl. border lines and Large regions) of people and vehicles
- Information availability, correlation and fusion
- Cross-analysis of databases, integrated visa/immigration facilities control systems
- BLUE Wide Area Surveillance (EEZ and Beyond) in wide areas through active and passive means.
- Land small area surveillance of people, equipment and vehicles in controlled areas
- Remote detection of shipping containers
- Continuity, coverage, performance (incl. UAV; secure data link)
- Small area surveillance (Ports and Harbours)
- AIR 3D Surveillance (Incl. border lines and Large regions), linked to the ATM systems

- RFID based tracing
- Digital signal processing technology
- Image / pattern processing technology
- Surveillance and navigation satellites
- Data and information management technology (DB, ...)
- Unmanned land / sea / air vehicles

Information Management

- Data fusion techniques: Design, development and application of data/information fusion techniques. Examples contain data mining, trend detection, forgetting data, optimization analysis.
- Information exchange: techniques to facilitate the exchange of information between non interoperable information systems.
- Semantics, topology: development of topologies and ontologies to facilitate data exchange based on semantic translations and common definitions of content.
- Secure interoperability: techniques to insure secure interoperability between current and future systems, domain different systems (i.e. civil and military) including data access control and data exchange without source availability

- Data fusion techniques
- Text-mining / data-mining
- Information fusion technology

Communication

- Solutions for ensuring end-to-end communication availability, relying on physical and logical technologies, on diversity of hybrid systems
- End-to-end quality of service, covering specific requirements for priority traffic and ensuring the QoS is guaranteed under all conditions
- Interoperable and robust solutions for software defined radio
- Dynamic authentication in ad hoc wireless networks for emergency communication
- Physical integration of C4 equipment and interface with carrying platforms – Equipment of limited cost, dimensions, mass, power supply

- Communications network management and control equipment, network supervisor
- Authentication technologies
- Broadband access to mobile users in dynamic situations / EM difficult scenarios
- Secured, wireless broadband data links for secured communications

Detection, Identification and authentication

- Access control. Authentication of people and vehicles
- Land Small area – detection of potential threats
- LAND Wide Area – Detection of personnel and vehicles movements
- BLUE Wide Area (EEZ and Beyond) – Detection of large and small (fast) boats in a maritime environment
- AIR 3D detection of manned and unmanned, UAV and light aircraft
- Small Blue area (Ports and Harbours) Detection of large and small (fast) boats and swimmers
- Drugs, explosives, Viri, CBRN detection. Very fast early warning. After alert checking of type and identification.
- Detection of people attempting to enter illegally.
- UNDERWATER 3D, Detection of underwater vehicles: at regulated borders (harbours).
- Land Small area – detection of potential vehicle threats

- Earth observation
- Motion sensor systems
- Hyper-spectral / multi-spectral processing
- Explosive detection sensors
- Helicopters
- IR sensor technologies
- SAR / ISAR equipment
- Acoustic sensors
- Radar sensors

- Autonomous small sensors / smart dust technologies
- Hyper spectral / multi spectral sensors
- Non-Co-operative Target Recognition
- Digital fingerprints recognition
- Chemical and biological detection technologies

Training and exercise

- Develop training, education and simulation facilities. Description: With the use of scenario and situation modelling, computer aided training, and simulation

- Training techniques
- Synthetic environments – synthetic force generation
- Mission simulation

Figure 3

Border security

– overview diagram of the main functions, capabilities and technologies

Preliminary Steps

1. *satisfy essential conditions,*
2. *provide leadership / sponsorship*
3. *define the scope and boundaries*

Essential Conditions

1. A need for the technology roadmap,

2. Input and participation from several different parts of the organization

Leadership / Sponsorship

- Committed leadership
  - time and effort is involved in creating the technology roadmap.
- Leadership and sponsorship
  - should come from one of the participants
- Roadmap
  - used to make resource allocation decisions.

Define the scope and boundaries for the technology roadmap

- A vision that the roadmap can support

- Boundaries and the scope of the roadmap

- Planning horizon and the level of details

7 Steps of Development

1. Identify the “product” - focus of the roadmap,

2. Identify critical system requirements and targets,

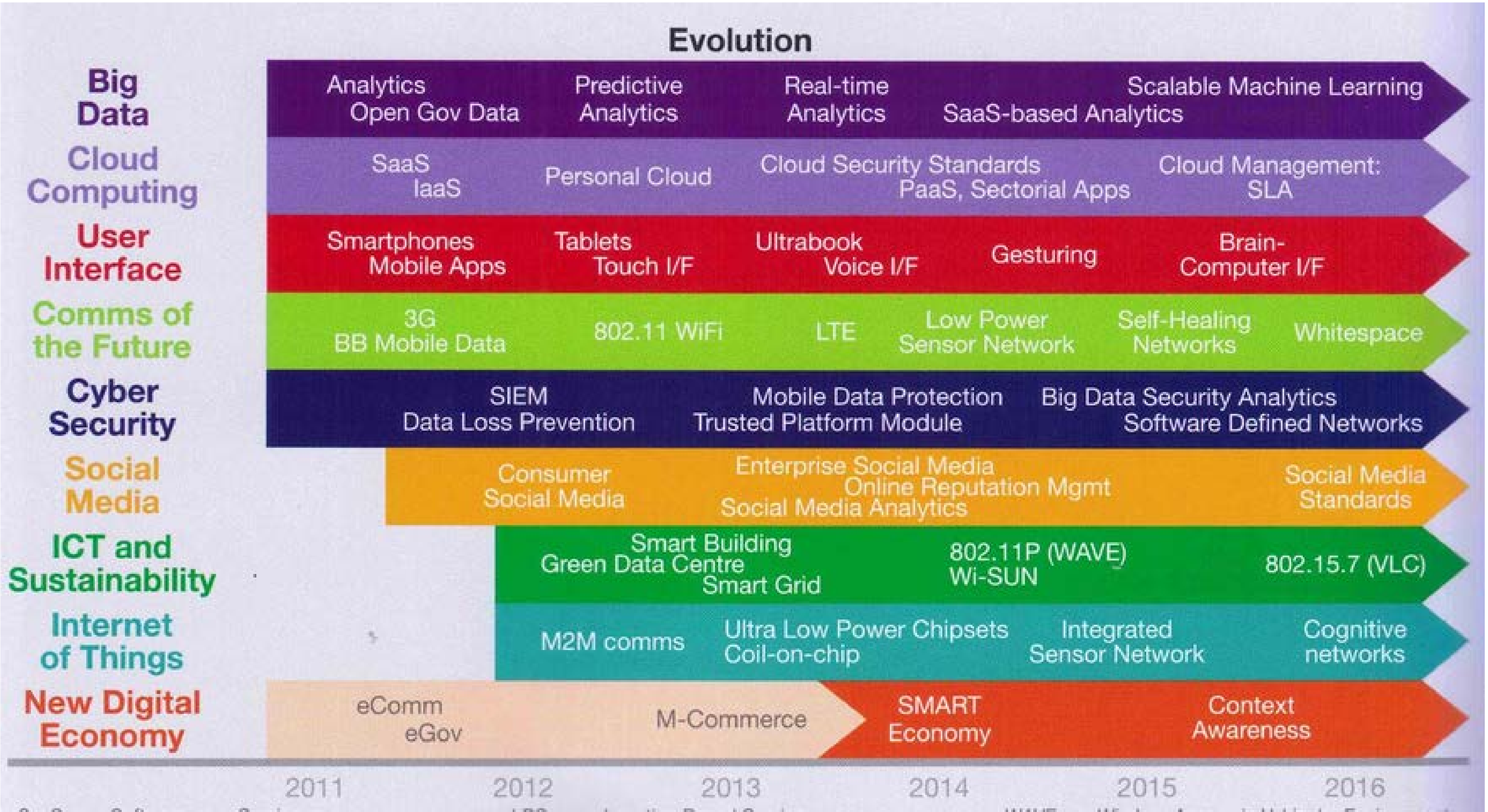
3. Specify major technology areas,

4. Specify the technology drivers and targets,

5. Identify technology alternatives and timelines,

6. Recommend technology alternatives to be pursued

7. create the technology roadmap



Evolution

Big Data
Analytics
Open Gov Data
Predictive Analytics
Real-time Analytics
SaaS-based Analytics
Scalable Machine Learning

Cloud Computing
SaaS
IaaS
Personal Cloud
Cloud Security Standards
PaaS, Sectorial Apps
Cloud Management: SLA

User Interface
Smartphones
Mobile Apps
Tablets
Touch I/F
Ultrabook
Voice I/F
Gesturing
Brain-Computer I/F

Comms of the Future
3G
BB Mobile Data
802.11 WiFi
LTE
Low Power Sensor Network
Self-Healing Networks
Whitespace

Cyber Security
SIEM
Data Loss Prevention
Mobile Data Protection
Trusted Platform Module
Big Data Security Analytics
Software Defined Networks

Social Media
Consumer Social Media
Enterprise Social Media
Online Reputation Mgmt
Social Media Analytics
Social Media Standards

ICT and Sustainability
Smart Building
Green Data Centre
Smart Grid
802.11P (WAVE)
Wi-SUN
802.15.7 (VLC)

Internet of Things
M2M comms
Ultra Low Power Chipsets
Coil-on-chip
Integrated Sensor Network
Cognitive networks

New Digital Economy
eComm
eGov
M-Commerce
SMART Economy
Context Awareness

SaaS - Software-as-a-Service
IaaS - Infrastructure-as-a-Service
PaaS - Platform-as-a-Service
LTE - Long Term Evolution

LBS - Location Based Service
SMART - Social, mobile, apps, real-time and trusted
SIEM - Security info & event mgmt
Wi-SUN - Wireless Smart Utility Network

WAVE - Wireless Access in Vehicular Environment
VLC - Visible Light Communications

Identify the “product” that will be the focus of the roadmap

- Common product needs are identified and should be agreed on by all the participants.

- Acceptance of all groups for the process.

- In case of uncertainty of the product needs **scenario-based planning** can be used to determine the common product needs.

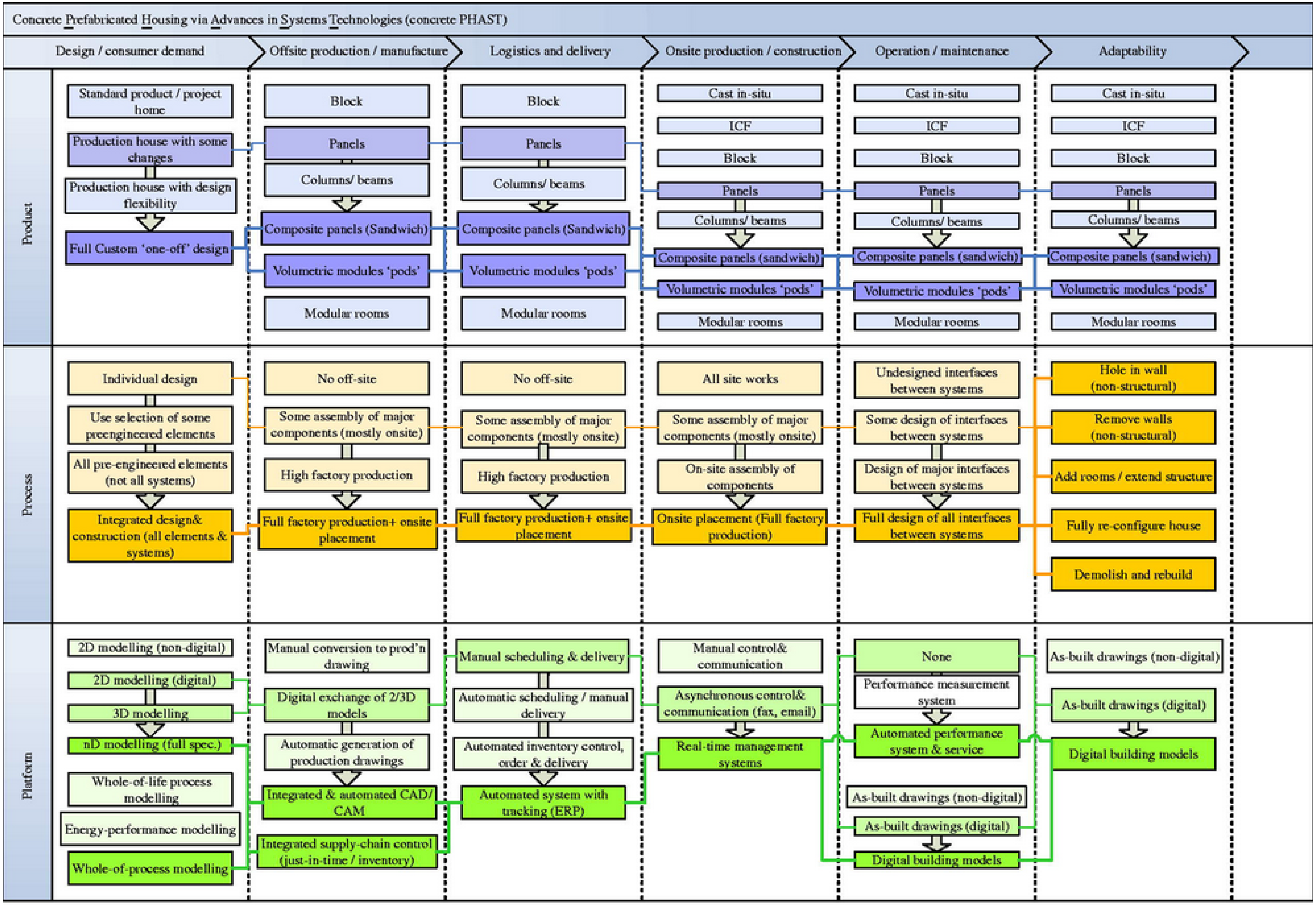
Identify the critical system requirements and their targets

- **Critical system requirements** provide the overall framework for the technology roadmap.
- Requirements can have targets like reliability and costs.

Specify the Major Technology Areas

- These are the areas which can help achieve the critical system requirements

- Technology areas may include several different technologies



Concrete Prefabricated Housing via Advances in Systems Technologies (concrete PHAST)

	Design / consumer demand	Offsite production / manufacture	Logistics and delivery	Onsite production / construction	Operation / maintenance	Adaptability
Product	Standard product / project home Production house with some changes Production house with design flexibility Full Custom 'one-off' design	Block Panels Columns/ beams Composite panels (Sandwich) Volumetric modules 'pods' Modular rooms	Block Panels Columns/ beams Composite panels (Sandwich) Volumetric modules 'pods' Modular rooms	Cast in-situ ICF Block Panels Columns/ beams Composite panels (sandwich) Volumetric modules 'pods' Modular rooms	Cast in-situ ICF Block Panels Columns/ beams Composite panels (sandwich) Volumetric modules 'pods' Modular rooms	Cast in-situ ICF Block Panels Columns/ beams Composite panels (sandwich) Volumetric modules 'pods' Modular rooms
Process	Individual design Use selection of some preengineered elements All pre-engineered elements (not all systems) Integrated design& construction (all elements & systems)	No off-site Some assembly of major components (mostly onsite) High factory production Full factory production+ onsite placement	No off-site Some assembly of major components (mostly onsite) High factory production Full factory production+ onsite placement	All site works Some assembly of major components (mostly onsite) On-site assembly of components Onsite placement (Full factory production)	Undesigned interfaces between systems Some design of interfaces between systems Design of major interfaces between systems Full design of all interfaces between systems	Hole in wall (non-structural) Remove walls (non-structural) Add rooms / extend structure Fully re-configure house Demolish and rebuild
Platform	2D modelling (non-digital) 2D modelling (digital) 3D modelling nD modelling (full spec.) Whole-of-life process modelling Energy-performance modelling Whole-of-process modelling	Manual conversion to prod'n drawing Digital exchange of 2/3D models Automatic generation of production drawings Integrated & automated CAD/ CAM Integrated supply-chain control (just-in-time / inventory)	Manual scheduling & delivery Automatic scheduling / manual delivery Automated inventory control, order & delivery Automated system with tracking (ERP)	Manual control& communication Asynchronous control& communication (fax, email) Real-time management systems	None Performance measurement system Automated performance system & service As-built drawings (non-digital) As-built drawings (digital) Digital building models	As-built drawings (non-digital) As-built drawings (digital) Digital building models

Specify the technology drivers and their targets

- Critical system requirements are transformed into technology drivers (with targets)
- Drivers are the critical variables that will determine which technology alternatives are selected.
- Drivers depend on the technology areas but they relate to how the technology addresses the critical system requirements.

Identify Technology Alternatives and their Timelines

- Technology drivers and their targets are specified and the technology alternatives that can satisfy those targets are specified

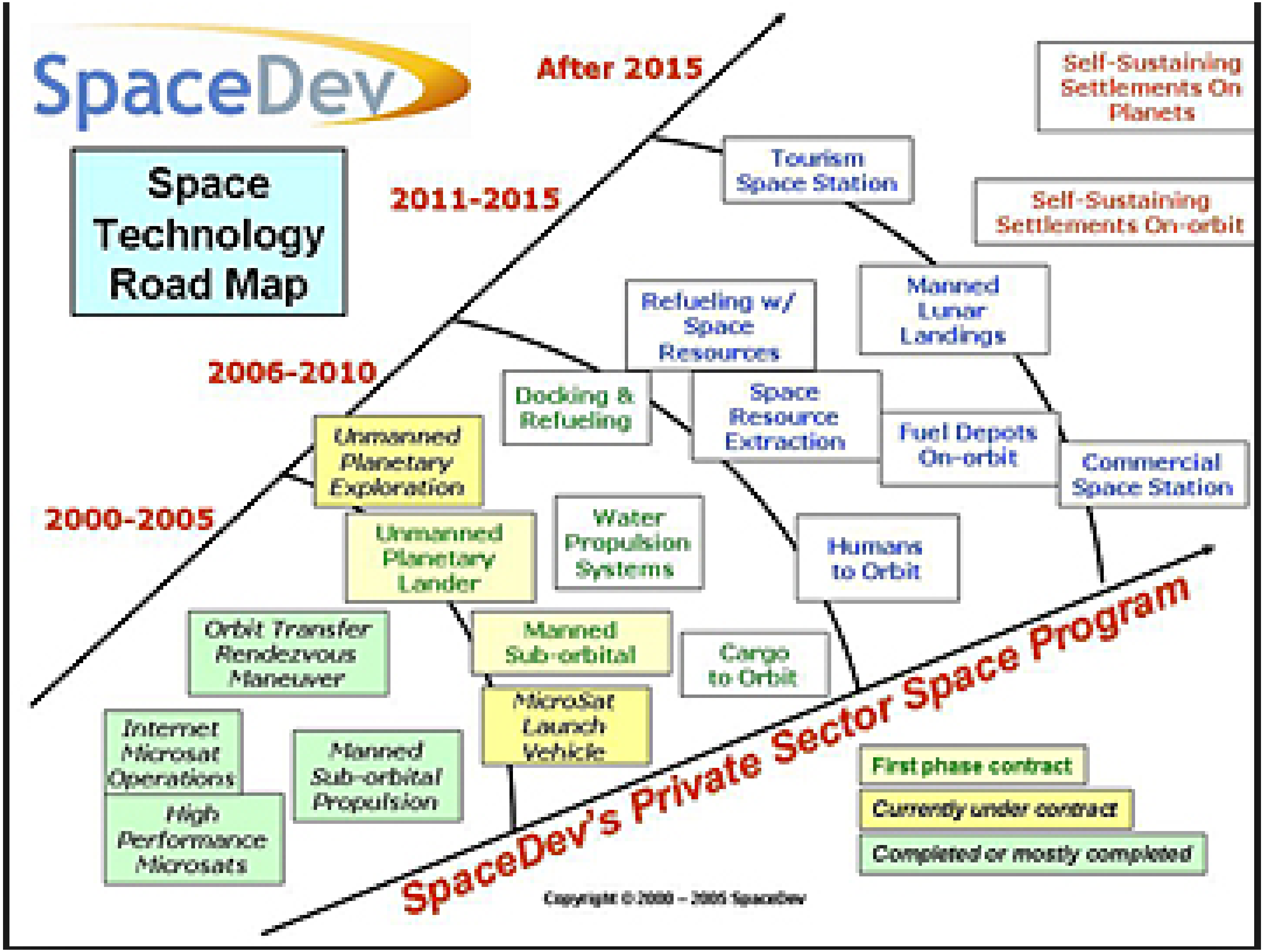
- For each of the alternatives a timeline is estimated for how it will mature with respect to the technology driver targets.

Recommend the technology alternatives that should be pursued

- Alternatives may differ in costs and timeline

- These alternatives will be pursued

- Trade-offs aremade between different alternatives for different targets, performance over costs and even target over target.



SpaceDev

Space Technology Road Map

2000-2005

2006-2010

2011-2015

After 2015

Internet Microsat Operations

High Performance Microsats

Orbit Transfer Rendezvous Maneuver

Manned Sub-orbital Propulsion

MicroSat Launch Vehicle

Unmanned Planetary Exploration

Unmanned Planetary Lander

Manned Sub-orbital

Docking & Refueling

Water Propulsion Systems

Cargo to Orbit

Refueling w/ Space Resources

Space Resource Extraction

Humans to Orbit

Fuel Depots On-orbit

Commercial Space Station

Manned Lunar Landings

Tourism Space Station

Self-Sustaining Settlements On-orbit

Self-Sustaining Settlements On Planets

SpaceDev's Private Sector Space Program

🟨 First phase contract

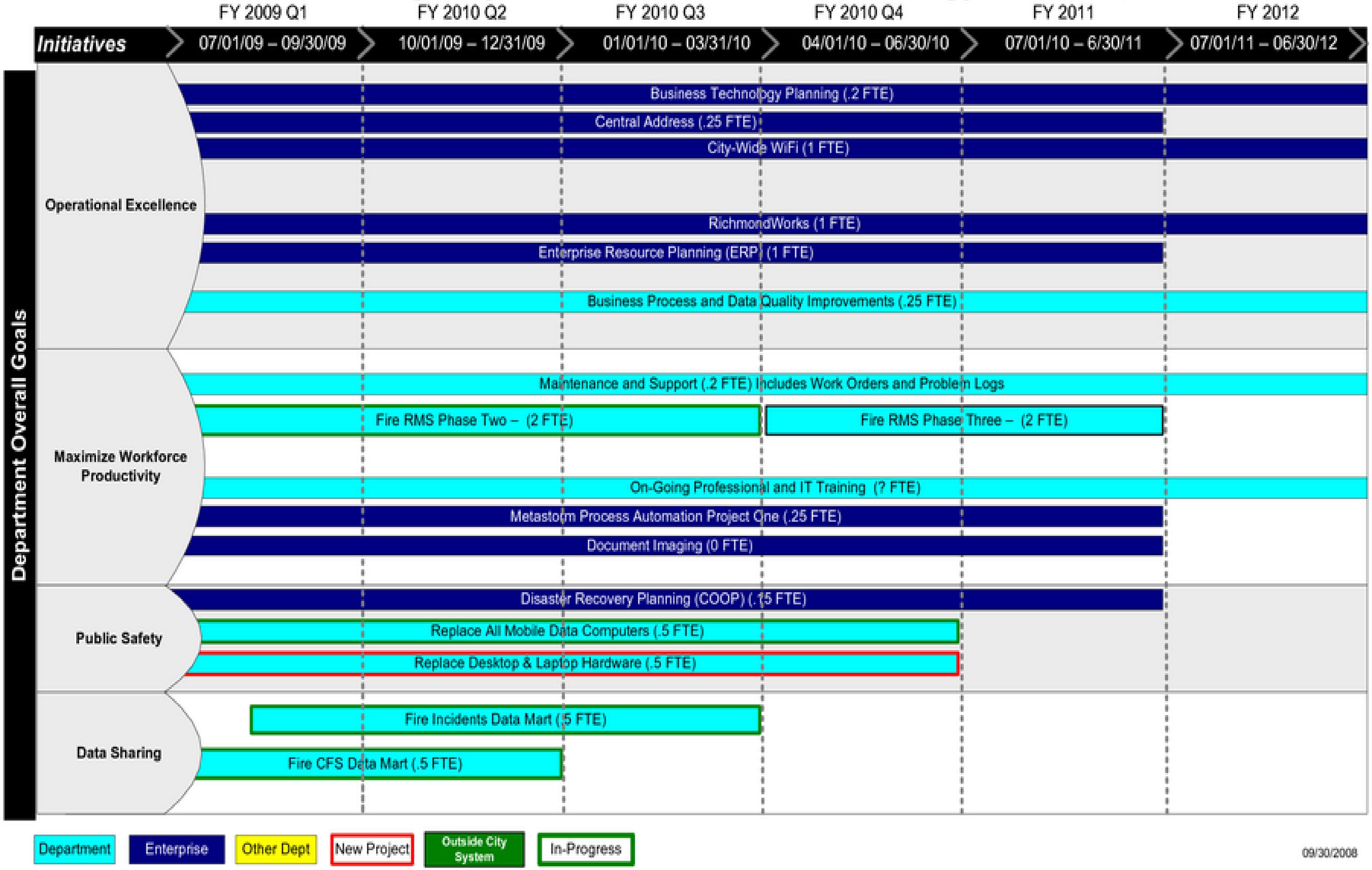
🟨 *Currently under contract*

🟩 *Completed or mostly completed*

Technology Roadmap Report

- Identification and description of each technology area
- Critical factors
- Unaddressed areas
- Implementation recommendations
- Technical recommendations.

Fire & Emergency Service Business Technology Roadmap



FY 2009 Q1 | FY 2010 Q2 | FY 2010 Q3 | FY 2010 Q4 | FY 2011 | FY 2012

Initiatives
07/01/09 – 09/30/09
10/01/09 – 12/31/09
01/01/10 – 03/31/10
04/01/10 – 06/30/10
07/01/10 – 6/30/11
07/01/11 – 06/30/12

Department Overall Goals

Operational Excellence
- Business Technology Planning (.2 FTE)
- Central Address (.25 FTE)
- City-Wide WiFi (1 FTE)
- RichmondWorks (1 FTE)
- Enterprise Resource Planning (ERP) (1 FTE)
- Business Process and Data Quality Improvements (.25 FTE)

Maximize Workforce Productivity
- Maintenance and Support (.2 FTE) Includes Work Orders and Problem Logs
- Fire RMS Phase Two – (2 FTE)
- Fire RMS Phase Three – (2 FTE)
- On-Going Professional and IT Training (? FTE)
- Metastorm Process Automation Project One (.25 FTE)
- Document Imaging (0 FTE)

Public Safety
- Disaster Recovery Planning (COOP) (.15 FTE)
- Replace All Mobile Data Computers (.5 FTE)
- Replace Desktop & Laptop Hardware (.5 FTE)

Data Sharing
- Fire Incidents Data Mart (.5 FTE)
- Fire CFS Data Mart (.5 FTE)

Department | Enterprise | Other Dept | New Project | Outside City System | In-Progress

09/30/2008

Knowledge and skills required

- Requires certain knowledge and skills
- Some participants must know the process of technology roadmapping.
- Group-process and interpersonal skills required
- Process includes a lot of discussion
- May need a facilitator.

Agilent Technologies

POST

BMO Financial Group

Chevron

EMC²

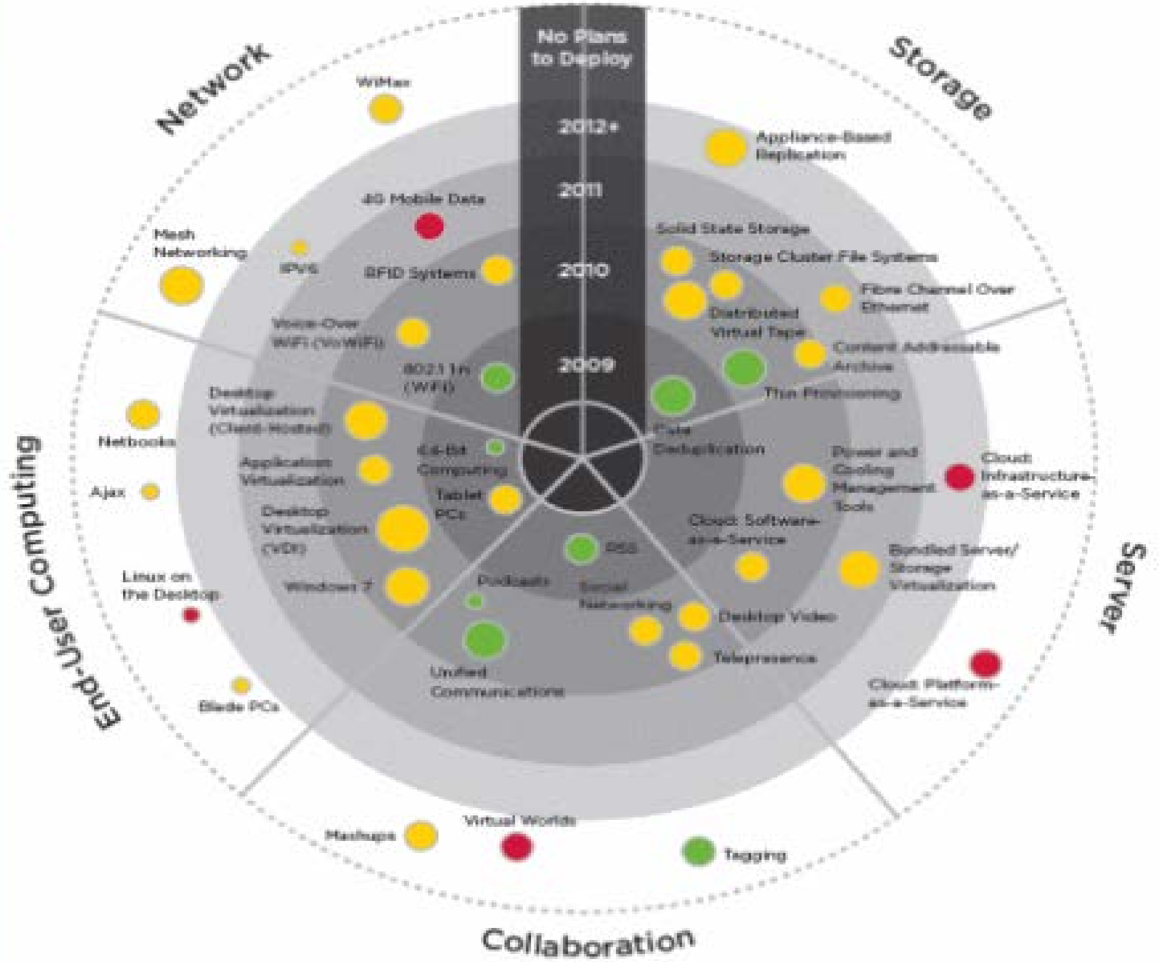
ExxonMobil

Ford Motor Company

General Mills

Kellogg's

Lowe's



Enterprise Value

Enterprise value represents the potential benefit that can be delivered.

○ High Value
○ Medium Value
○ Low Value
○ Minimal Value

Value is assessed by the factors below:

- Effect on Capital Expenditure
- Effect on Performance
- Effect on Operational Expenditure
- Effect on Availability
- Functionality Benefits

Deployment Risk

Deployment risk represents the likelihood of operational failure.

● High Risk
● Medium Risk
● Low Risk

Risk is assessed by the factors below:

- Marketplace Maturity
- Management Tools
- Scalability
- Architecture Integration
- Support Skills
- Security

Medtronic

MERCK

Northeast Utilities System

RADIAN

RBC Financial Group

Roche

StanCorp Financial Group

Sun

TIFFANY & CO.

VeriSign

Weyerhaeuser

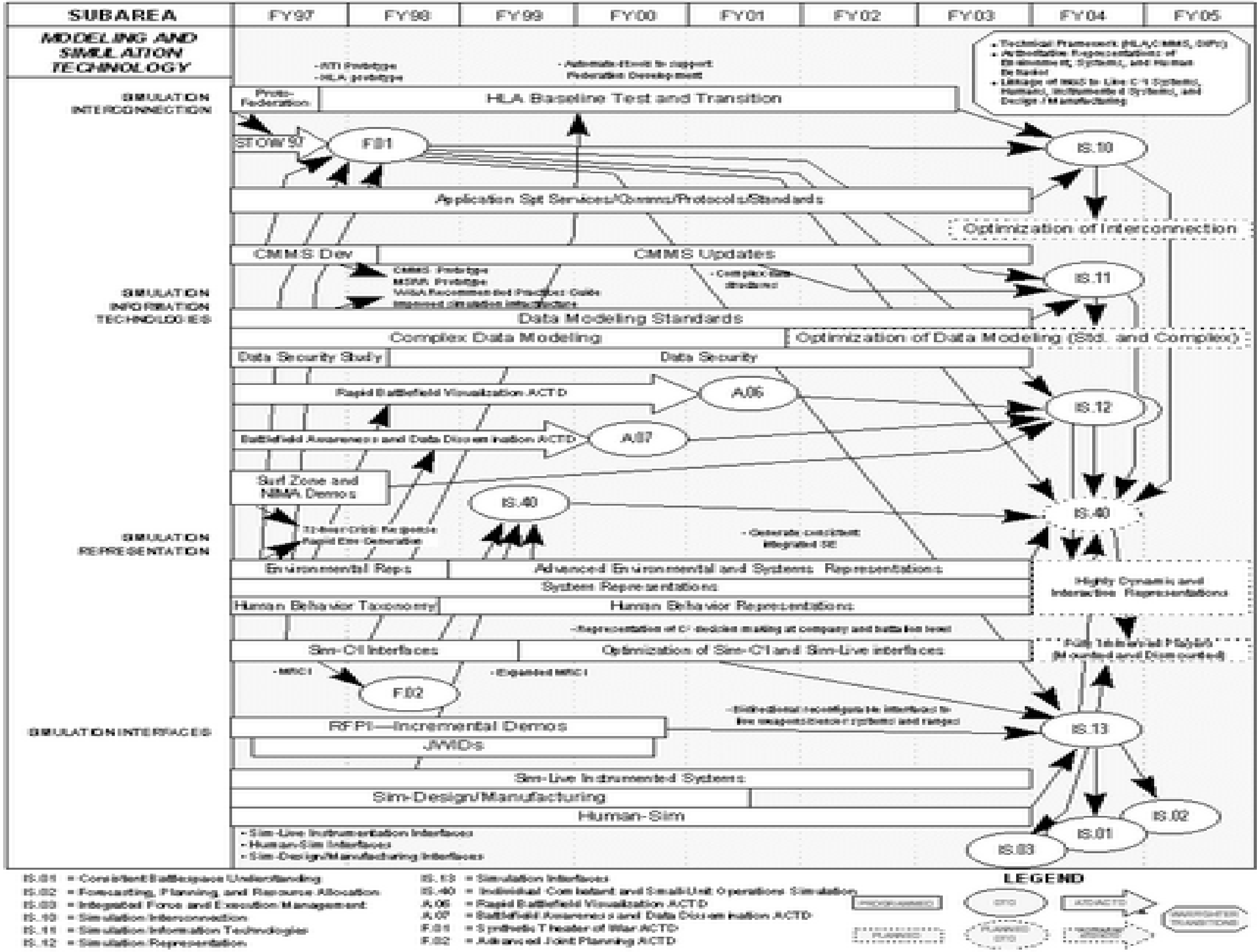
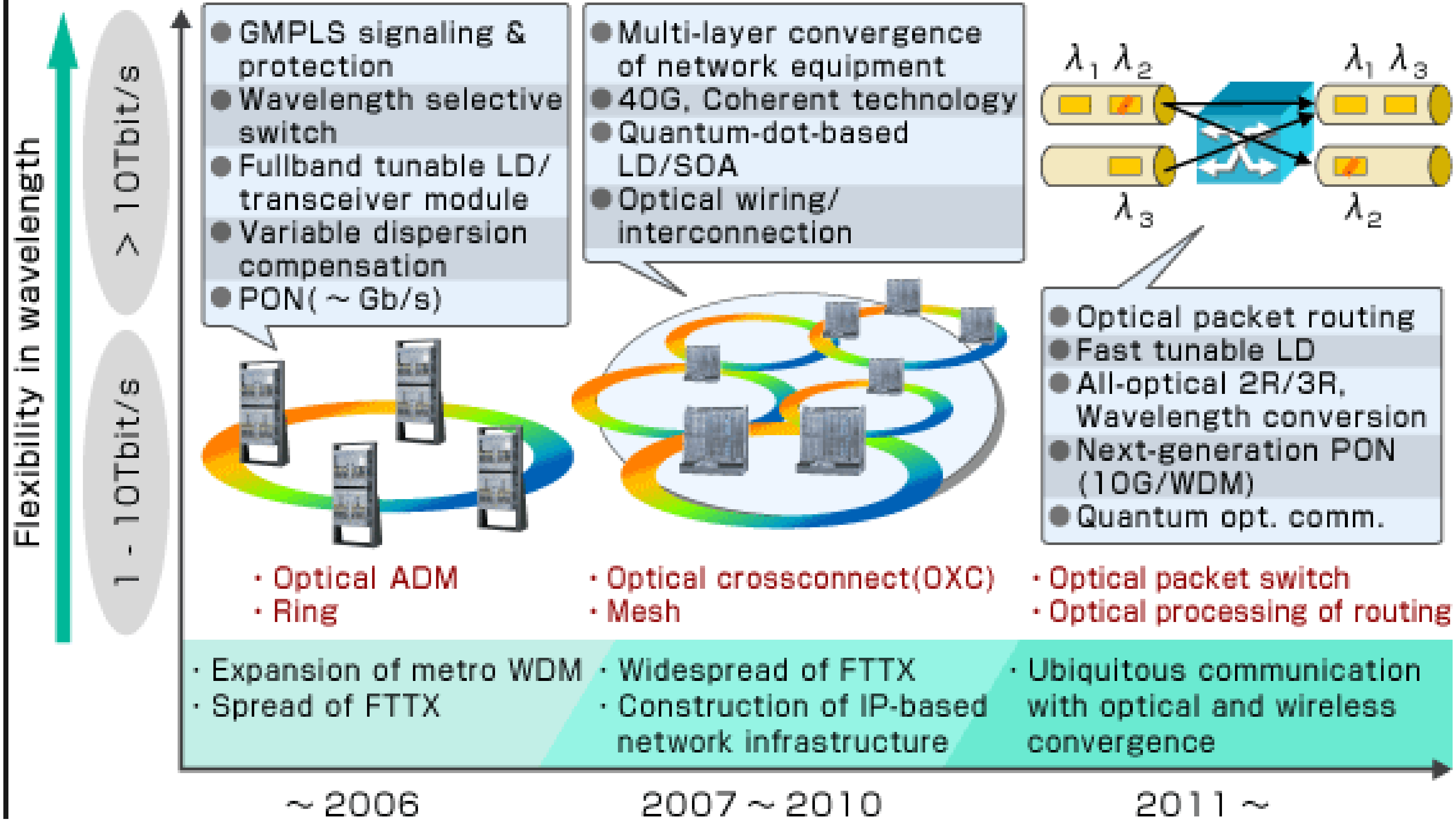


Figure III–9. Modeling and Simulation Roadmap

Roadmap of FUJITSU Photonics Technology



- GMPLS signaling & protection
- Wavelength selective switch
- Fullband tunable LD/transceiver module
- Variable dispersion compensation
- PON(~ Gb/s)

- Multi-layer convergence of network equipment
- 40G, Coherent technology
- Quantum-dot-based LD/SOA
- Optical wiring/interconnection

- Optical packet routing
- Fast tunable LD
- All-optical 2R/3R, Wavelength conversion
- Next-generation PON (10G/WDM)
- Quantum opt. comm.

- Optical ADM
- Ring

- Optical crossconnect(OXC)
- Mesh

- Optical packet switch
- Optical processing of routing

- Expansion of metro WDM
- Spread of FTTX

- Widespread of FTTX
- Construction of IP-based network infrastructure

- Ubiquitous communication with optical and wireless convergence

~2006

2007~2010

2011~

IBM Semiconductor technology roadmap

View the Power.org Power Architecture Processor Roadmap at http://www.power.org/resources/devcorner/roadmap.

	350–500 nm	250 nm	180 nm	130 nm	90 nm	65 nm	45 nm
ASIC			SA-27E	Cu-11	Cu-08	Cu-65HP	Cu-45HP
SOI			7RFSOI		10KE	11S0	
CMOS		6SF	7SF	8SFG	9SF	10SF	
Low power (LP)					9LP	10LP	11LP
RF CMOS		6RF	7RF 7HV	8RF	9RF	10RF	
Image Sensor			7SF/CIMG	7HY/CIMG			
SiGe BiCMOS	5PAe 5HPE 5HP/AM/DM/PA	6WL 6HP/DM	7WL 7HP	8WL 8HP			

---- Available through Common Platform™ technology manufacturing model

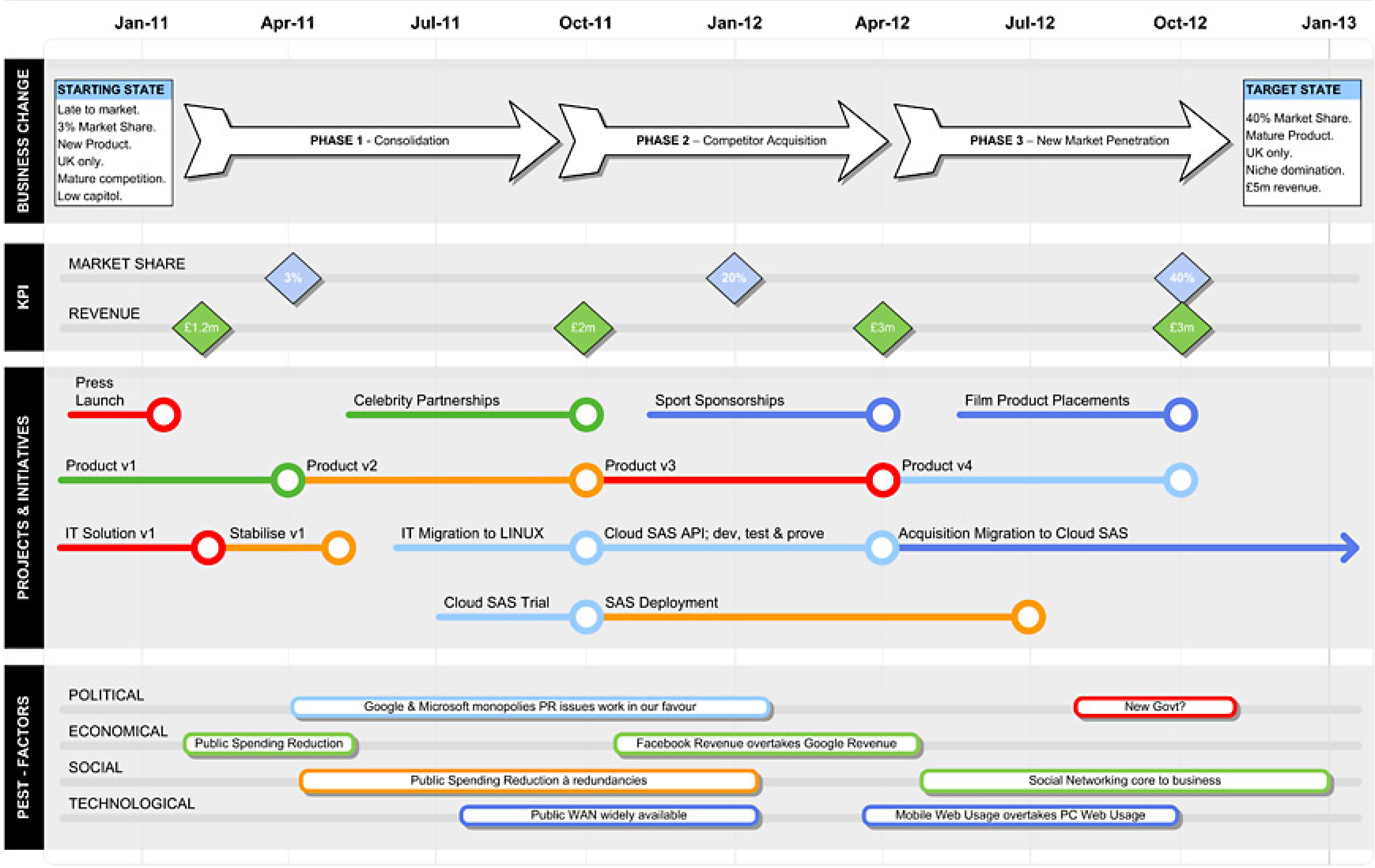
Version 2

Roadmap Template

subtitle

Saturday, 13 November 2010

TBC ○ OK ○ LOW RISK ○ MED RISK ○ HIGH RISK ○


Jan-11 Apr-11 Jul-11 Oct-11 Jan-12 Apr-12 Jul-12 Oct-12 Jan-13

BUSINESS CHANGE

STARTING STATE
Late to market.
3% Market Share.
New Product.
UK only.
Mature competition.
Low capitol.

PHASE 1 - Consolidation

PHASE 2 – Competitor Acquisition

PHASE 3 – New Market Penetration

TARGET STATE
40% Market Share.
Mature Product.
UK only.
Niche domination.
£5m revenue.

KPI

MARKET SHARE: 3% · 20% · 40%

REVENUE: £1.2m · £2m · £3m · £3m

PROJECTS & INITIATIVES

Press Launch · Celebrity Partnerships · Sport Sponsorships · Film Product Placements

Product v1 · Product v2 · Product v3 · Product v4

IT Solution v1 · Stabilise v1 · IT Migration to LINUX · Cloud SAS API; dev, test & prove · Acquisition Migration to Cloud SAS

Cloud SAS Trial · SAS Deployment

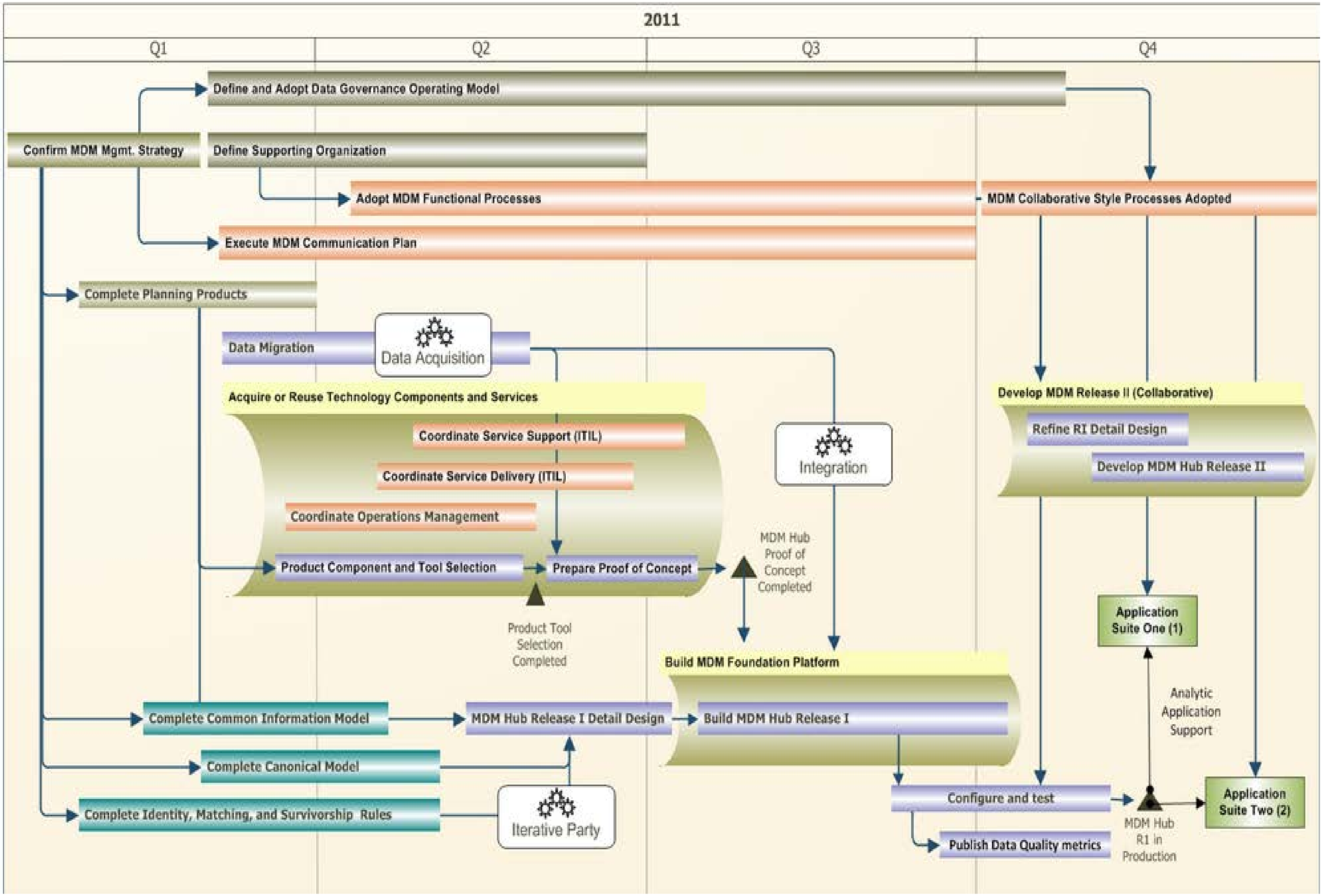
PEST - FACTORS

POLITICAL: Google & Microsoft monopolies PR issues work in our favour · New Govt?

ECONOMICAL: Public Spending Reduction · Facebook Revenue overtakes Google Revenue

SOCIAL: Public Spending Reduction à redundancies · Social Networking core to business

TECHNOLOGICAL: Public WAN widely available · Mobile Web Usage overtakes PC Web Usage



2011

Q1

Q2

Q3

Q4

Define and Adopt Data Governance Operating Model

Confirm MDM Mgmt. Strategy

Define Supporting Organization

Adopt MDM Functional Processes

MDM Collaborative Style Processes Adopted

Execute MDM Communication Plan

Complete Planning Products

Data Migration

Data Acquisition

Acquire or Reuse Technology Components and Services

Coordinate Service Support (ITIL)

Coordinate Service Delivery (ITIL)

Coordinate Operations Management

Product Component and Tool Selection

Prepare Proof of Concept

Product Tool Selection Completed

Integration

MDM Hub Proof of Concept Completed

Develop MDM Release II (Collaborative)

Refine RI Detail Design

Develop MDM Hub Release II

Application Suite One (1)

Analytic Application Support

Build MDM Foundation Platform

Complete Common Information Model

MDM Hub Release I Detail Design

Build MDM Hub Release I

Complete Canonical Model

Complete Identity, Matching, and Survivorship Rules

Iterative Party

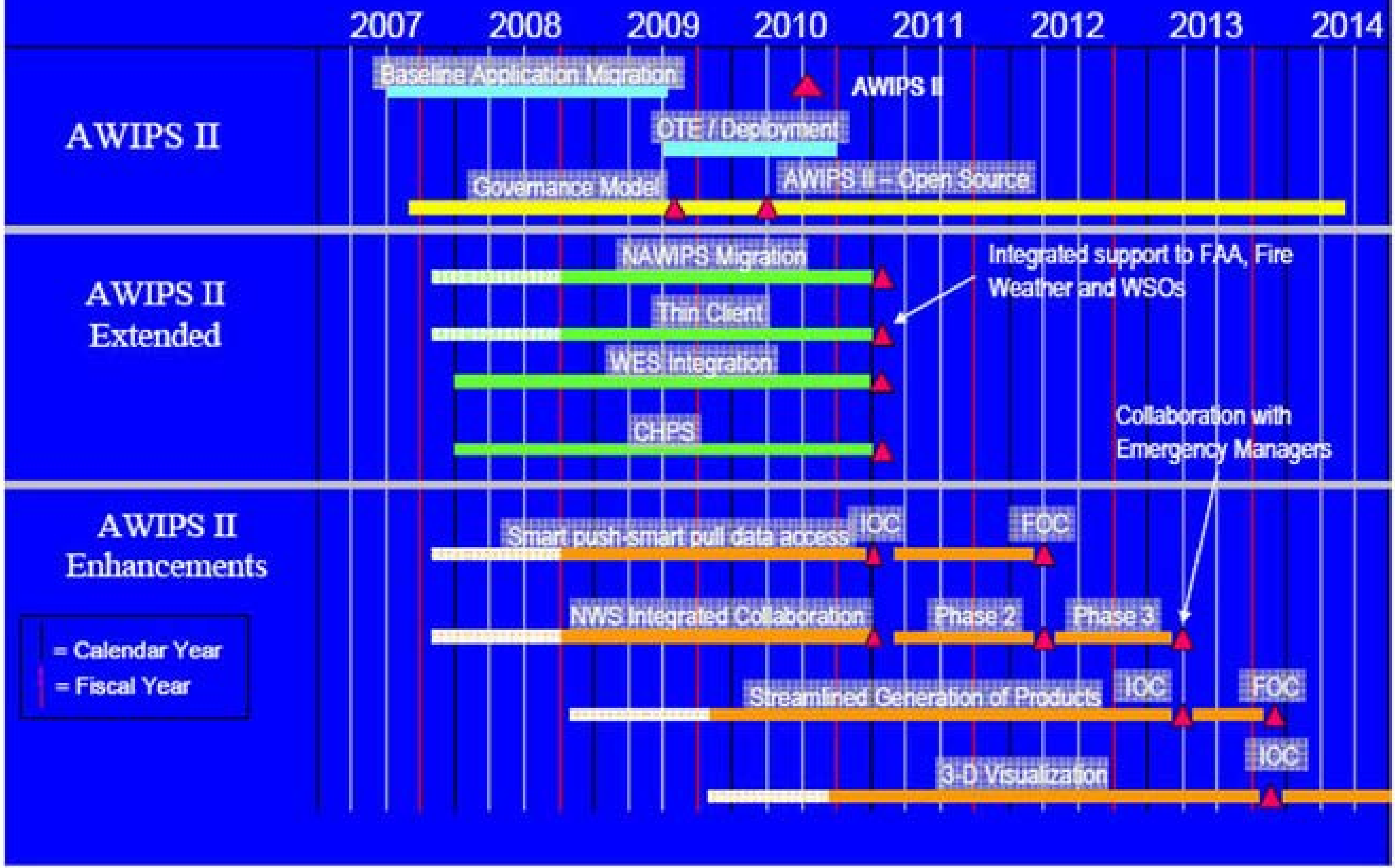
Configure and test

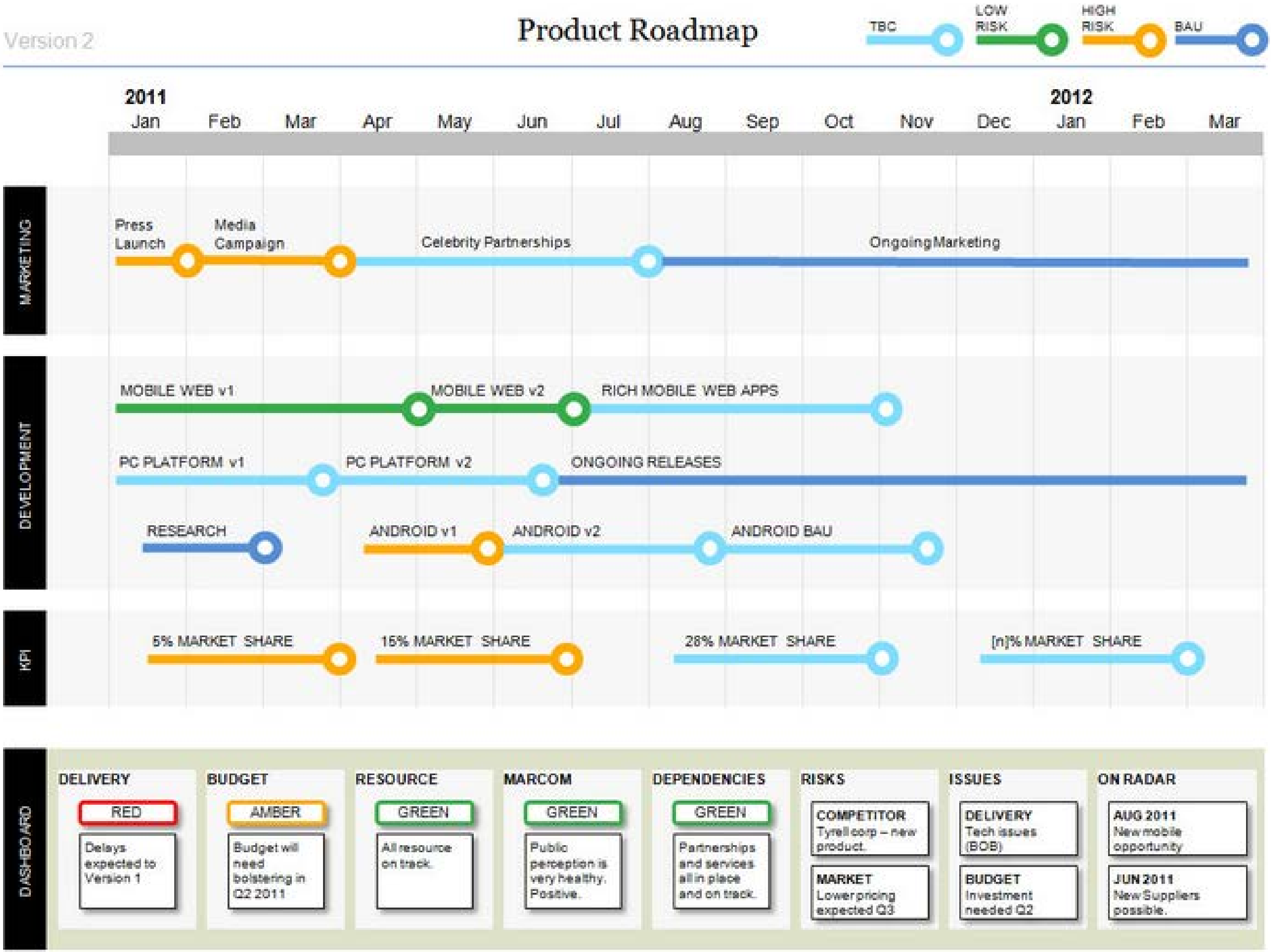
Publish Data Quality metrics

MDM Hub R1 in Production

Application Suite Two (2)

AWIPS Technology Infusion
Roadmap





Version 2

Product Roadmap

TBC

LOW RISK

HIGH RISK

BAU

2011

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

2012

Jan Feb Mar

MARKETING

Press Launch

Media Campaign

Celebrity Partnerships

OngoingMarketing

DEVELOPMENT

MOBILE WEB v1

MOBILE WEB v2

RICH MOBILE WEB APPS

PC PLATFORM v1

PC PLATFORM v2

ONGOING RELEASES

RESEARCH

ANDROID v1

ANDROID v2

ANDROID BAU

KPI

5% MARKET SHARE

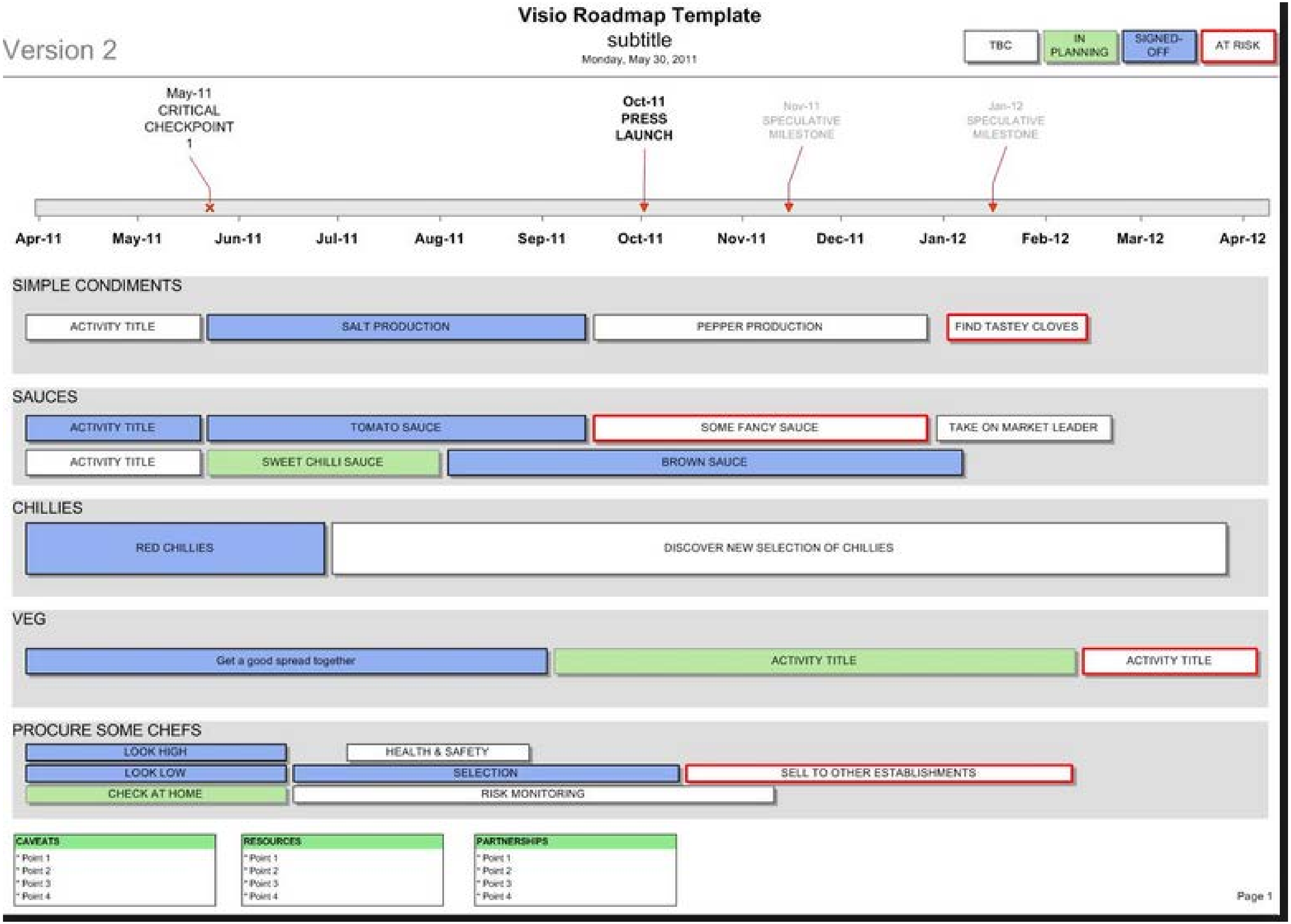
15% MARKET SHARE

28% MARKET SHARE

[n]% MARKET SHARE

DASHBOARD

DELIVERY	BUDGET	RESOURCE	MARCOM	DEPENDENCIES	RISKS	ISSUES	ON RADAR
RED	AMBER	GREEN	GREEN	GREEN	**COMPETITOR** Tyrell corp – new product.	**DELIVERY** Tech issues (BOB)	**AUG 2011** New mobile opportunity
Delays expected to Version 1	Budget will need bolstering in Q2 2011	All resource on track.	Public perception is very healthy. Positive.	Partnerships and services all in place and on track.	**MARKET** Lower pricing expected Q3	**BUDGET** Investment needed Q2	**JUN 2011** New Suppliers possible.



Visio Roadmap Template

subtitle

Monday, May 30, 2011

Version 2

TBC | IN PLANNING | SIGNED-OFF | AT RISK

May-11 CRITICAL CHECKPOINT 1

Oct-11 PRESS LAUNCH

Nov-11 SPECULATIVE MILESTONE

Jan-12 SPECULATIVE MILESTONE

Apr-11 | May-11 | Jun-11 | Jul-11 | Aug-11 | Sep-11 | Oct-11 | Nov-11 | Dec-11 | Jan-12 | Feb-12 | Mar-12 | Apr-12

SIMPLE CONDIMENTS
- ACTIVITY TITLE
- SALT PRODUCTION
- PEPPER PRODUCTION
- FIND TASTEY CLOVES

SAUCES
- ACTIVITY TITLE
- TOMATO SAUCE
- SOME FANCY SAUCE
- TAKE ON MARKET LEADER
- ACTIVITY TITLE
- SWEET CHILLI SAUCE
- BROWN SAUCE

CHILLIES
- RED CHILLIES
- DISCOVER NEW SELECTION OF CHILLIES

VEG
- Get a good spread together
- ACTIVITY TITLE
- ACTIVITY TITLE

PROCURE SOME CHEFS
- LOOK HIGH
- HEALTH & SAFETY
- LOOK LOW
- SELECTION
- SELL TO OTHER ESTABLISHMENTS
- CHECK AT HOME
- RISK MONITORING

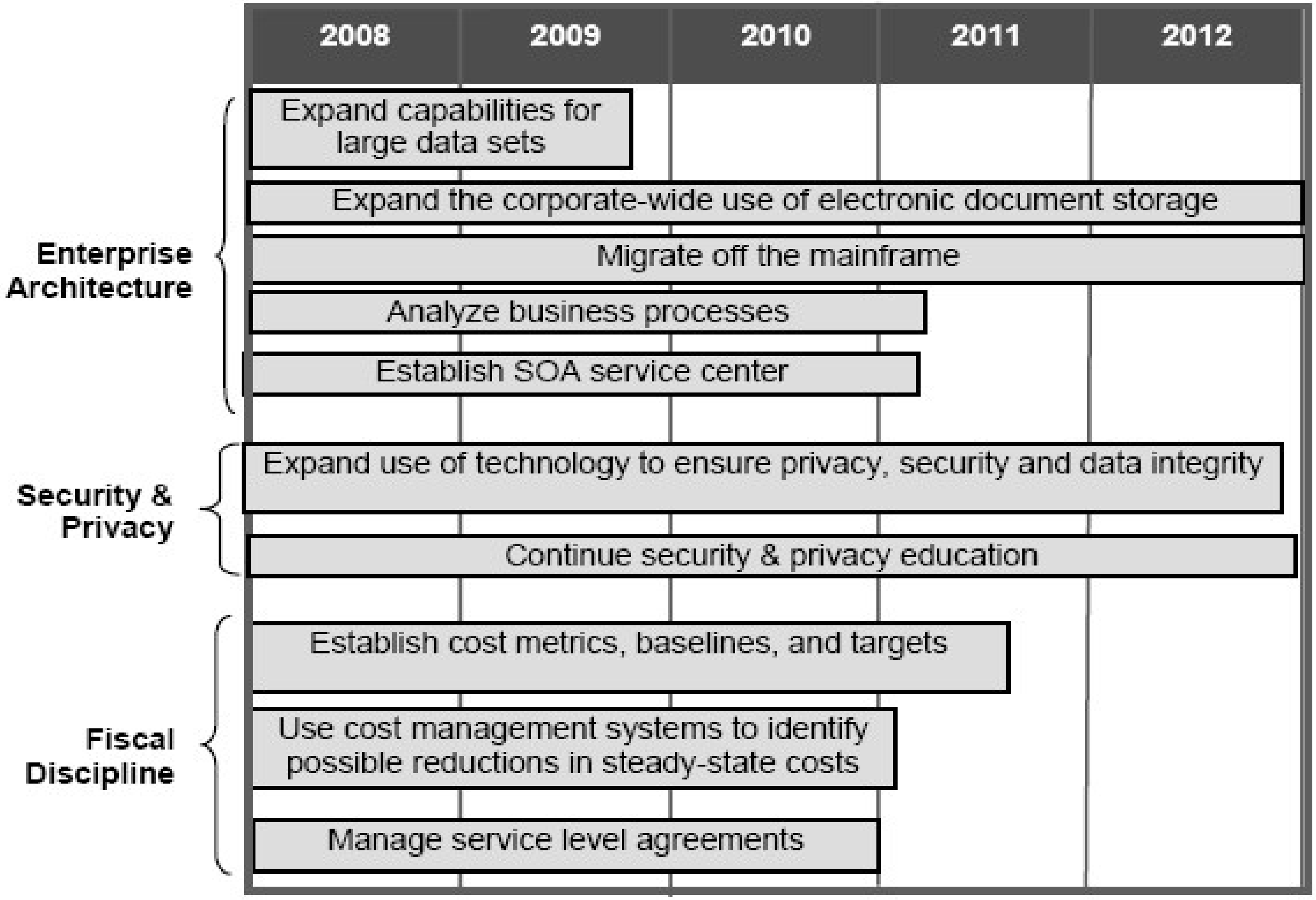
CAVEATS
- Point 1
- Point 2
- Point 3
- Point 4

RESOURCES
- Point 1
- Point 2
- Point 3
- Point 4

PARTNERSHIPS
- Point 1
- Point 2
- Point 3
- Point 4

Useful or Not?

Discussion



2008 2009 2010 2011 2012

Enterprise Architecture

Expand capabilities for large data sets

Expand the corporate-wide use of electronic document storage

Migrate off the mainframe

Analyze business processes

Establish SOA service center

Security & Privacy

Expand use of technology to ensure privacy, security and data integrity

Continue security & privacy education

Fiscal Discipline

Establish cost metrics, baselines, and targets

Use cost management systems to identify possible reductions in steady-state costs

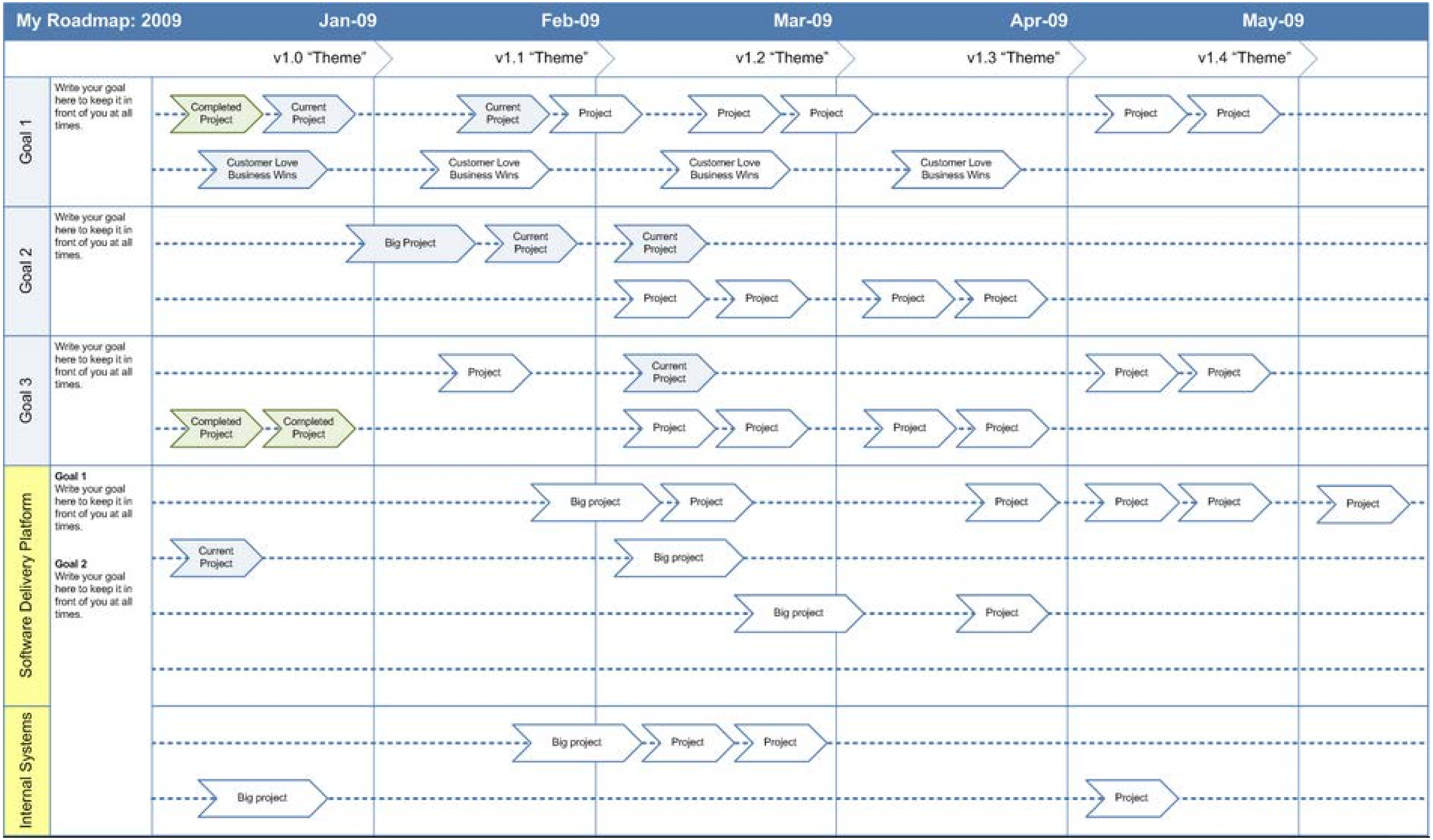
Manage service level agreements

Roadmap Questionaire

Your Company name:					
Field your company is working in: (please tick a box)	materials	tools	technology	wafer,cells or modules	other, please state
I would like to get more involved in the roadmap activity	yes	no			
I would like to get information, if there are any news	yes	no			
Name :					
email for contact:					

Roadmap Forum - give us your view

Your priority 1 important 2 interesting 3 not needed		2009	2010	2011	2013	2015	2017	2020	Remarks	Your comment
	Materials									
	Wafer Geometry									
	Thickness mono [µm]	180	180	160	140	130	110	100	Average of as cut thickness, measured according to Din EN 50513,	
	Your view on data									
	Thickness multi incl. ribbon [µm]	180	180	160	145	135	120	100		
	Your view on data									
	TTV [µm]	27.5	27.5	25	17.5	17.5	15	12.5	Total thickness variation measured according to Din EN 50513	
	Your view on data									
	Larger wafer than 156mm x 156mm	0	0	0	0	1	1	1	Yes= 1/ No=0	
	Your view on data								Please suggest size in comment.	
	Status rating wafer	0	0	0	1	2	3	3	see legend below	
	Your status rating									
	Heavy metals in metallization ink [yes/no]	1	1	0	0	0	0	0	Yes= 1/ No=0 heavy metals shall be added on purpose. Traces smaler 0,001% shall be	
	Your view									
	Reduce Ag [g/cell]	Ag should be significantly reduced from 2013 on								
	Your view									
	Which materials to replace Ag ?									
	Additionally								Should there be additional parameter like e.g. minority carrier lifetime for wafer or like e.g. replacement of harzardous chemicals ? Please make your suggestion	
	Your view									
	Your view									
	Your view									
	Your view									
	Process									
	mechanical yield loss	2.5	2	1.5	1.3	1.14	0.9	0.9	percentage of incoming products including handling that exhibit mechanical damage after process referring to above given wafer	
	Status rating yield loss with colour	0	0	0	1	2	3	3	see legend below	
	Your view on status rating									
	Your view on data									
	Uptime Semi E10									
	chemical processes [%]	96	96	96	97	97	97	97		



My Roadmap: 2009

Jan-09 Feb-09 Mar-09 Apr-09 May-09

v1.0 "Theme" v1.1 "Theme" v1.2 "Theme" v1.3 "Theme" v1.4 "Theme"

Goal 1

Write your goal here to keep it in front of you at all times.

Completed Project → Current Project → Current Project → Project → Project → Project → Project → Project

Customer Love Business Wins → Customer Love Business Wins → Customer Love Business Wins → Customer Love Business Wins

Goal 2

Write your goal here to keep it in front of you at all times.

Big Project → Current Project → Current Project

Project → Project → Project → Project

Goal 3

Write your goal here to keep it in front of you at all times.

Project → Current Project → Project → Project

Completed Project → Completed Project → Project → Project → Project → Project

Software Delivery Platform

Goal 1
Write your goal here to keep it in front of you at all times.

Goal 2
Write your goal here to keep it in front of you at all times.

Big project → Project → Project → Project → Project → Project

Current Project → Big project

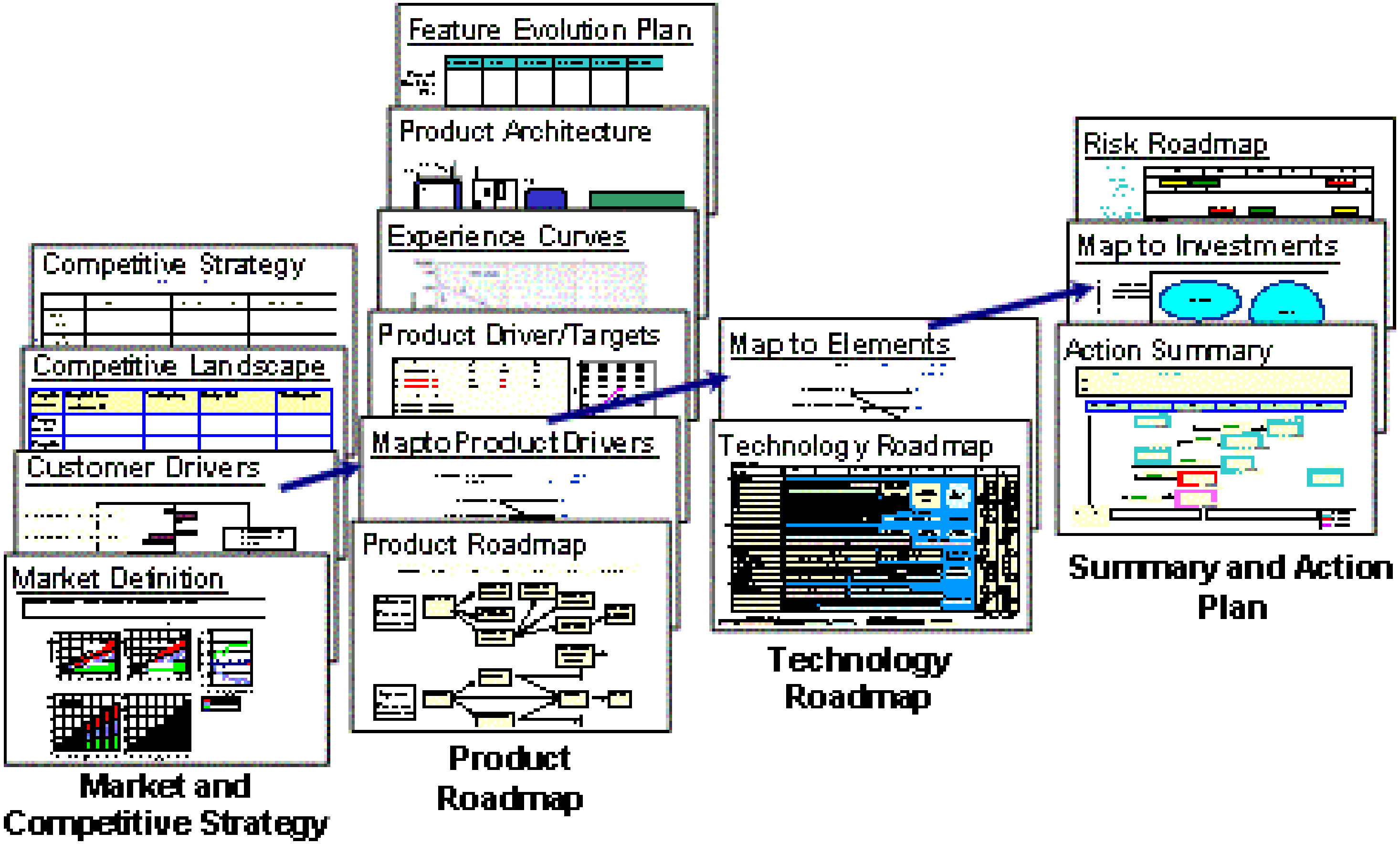
Big project → Project

Internal Systems

Big project → Project → Project

Big project → Project

Product-Technology Roadmap



Competitive Strategy
Competitive Landscape
Customer Drivers
Market Definition

Market and Competitive Strategy

Feature Evolution Plan
Product Architecture
Experience Curves
Product Driver/Targets
Map to Product Drivers
Product Roadmap

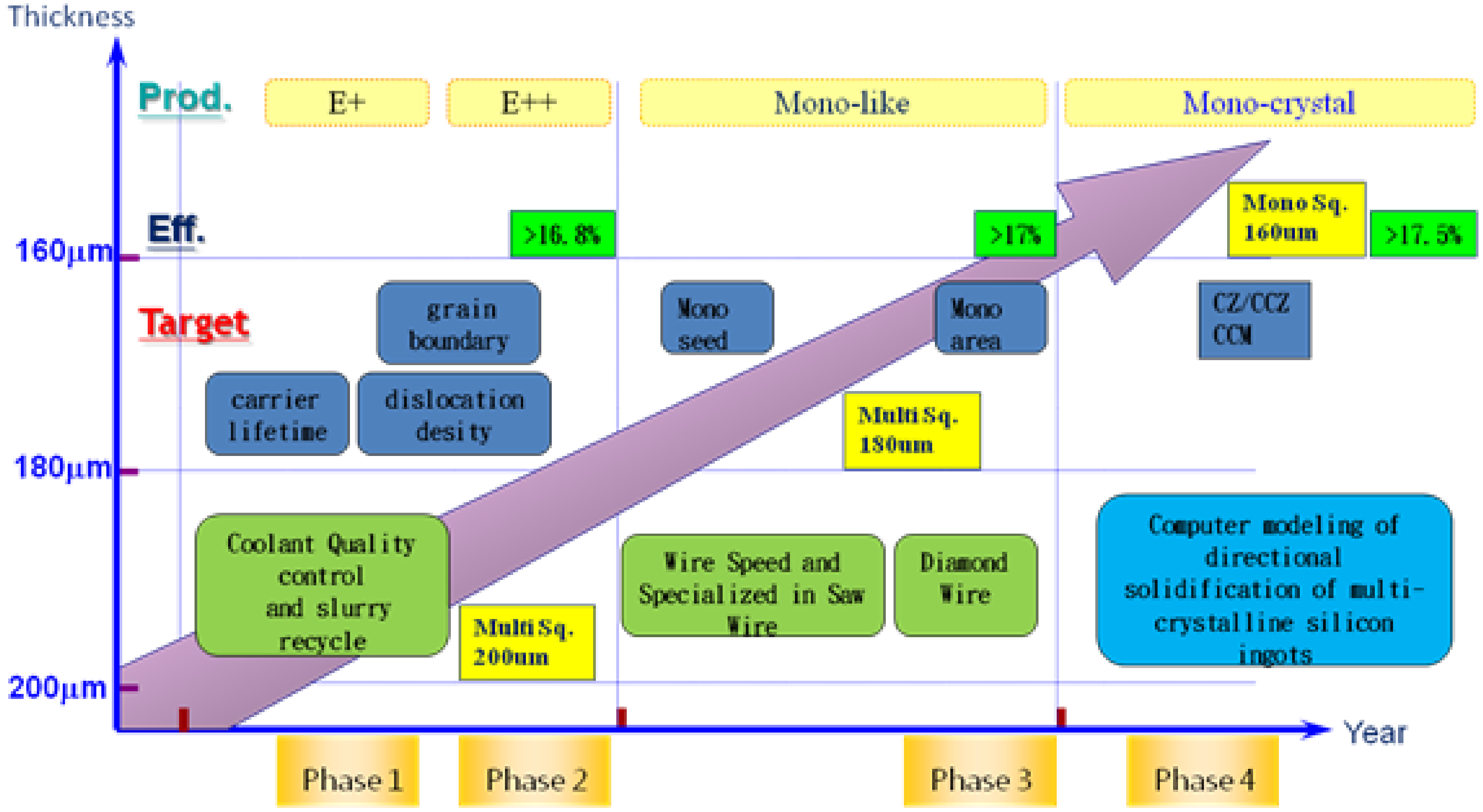
Product Roadmap

Map to Elements
Technology Roadmap

Technology Roadmap

Risk Roadmap
Map to Investments
Action Summary

Summary and Action Plan



Thickness

Prod.

E+

E++

Mono-like

Mono-crystal

Eff.

>16.8%

>17%

Mono Sq. 160um

>17.5%

160µm

Target

grain boundary

Mono seed

Mono area

CZ/CCZ CCM

carrier lifetime

dislocation desity

Multi Sq. 180um

180µm

Coolant Quality control and slurry recycle

Multi Sq. 200um

Wire Speed and Specialized in Saw Wire

Diamond Wire

Computer modeling of directional solidification of multi-crystalline silicon ingots

200µm

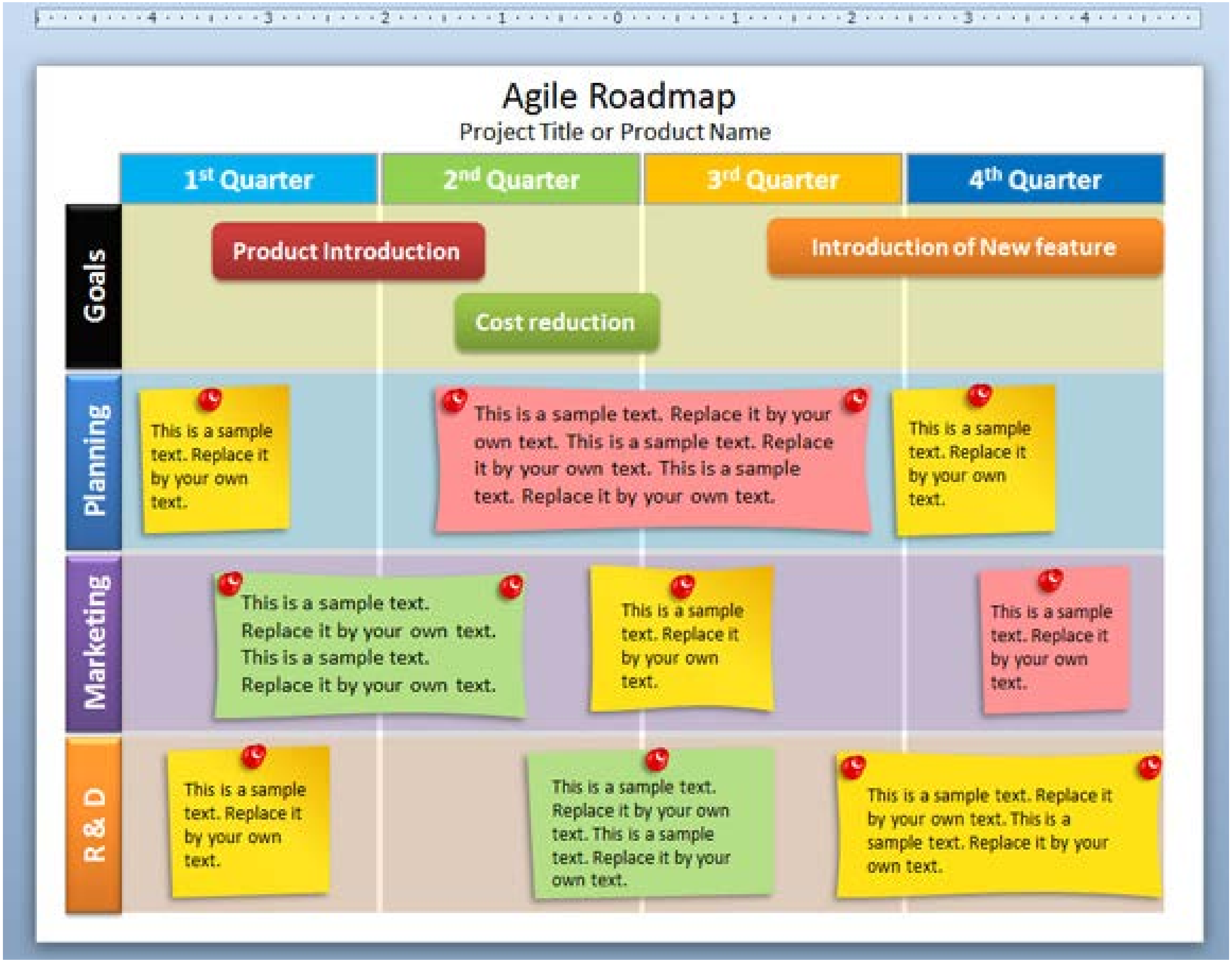
Year

Phase 1

Phase 2

Phase 3

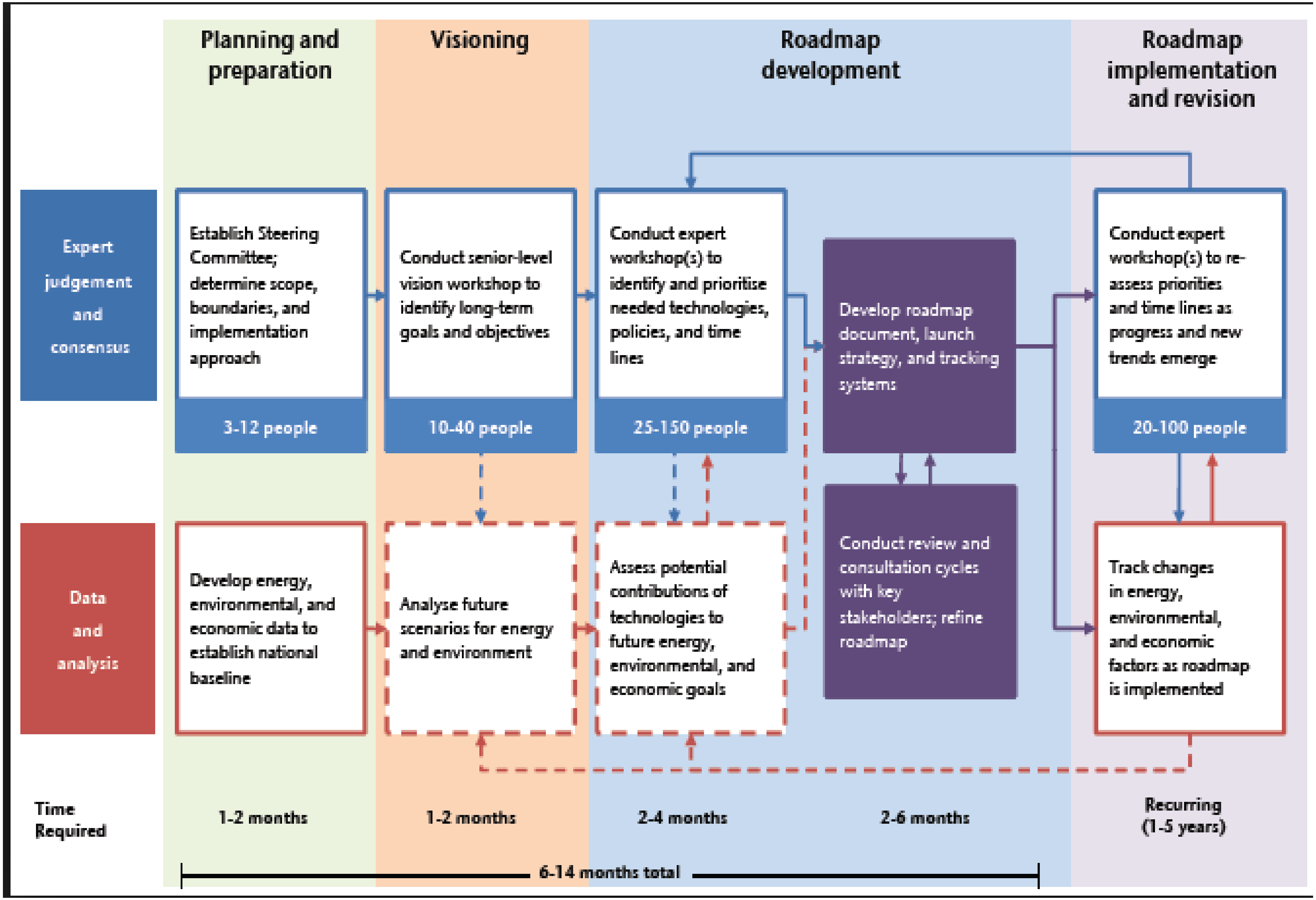
Phase 4



Agile Roadmap

Project Title or Product Name

	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
Goals	Product Introduction	Cost reduction		Introduction of New feature
Planning	This is a sample text. Replace it by your own text.	This is a sample text. Replace it by your own text. This is a sample text. Replace it by your own text. This is a sample text. Replace it by your own text.		This is a sample text. Replace it by your own text.
Marketing	This is a sample text. Replace it by your own text. This is a sample text. Replace it by your own text.		This is a sample text. Replace it by your own text.	This is a sample text. Replace it by your own text.
R & D	This is a sample text. Replace it by your own text.		This is a sample text. Replace it by your own text. This is a sample text. Replace it by your own text.	This is a sample text. Replace it by your own text. This is a sample text. Replace it by your own text.



Planning and preparation

Visioning

Roadmap development

Roadmap implementation and revision

Expert judgement and consensus

Establish Steering Committee; determine scope, boundaries, and implementation approach

3-12 people

Conduct senior-level vision workshop to identify long-term goals and objectives

10-40 people

Conduct expert workshop(s) to identify and prioritise needed technologies, policies, and time lines

25-150 people

Develop roadmap document, launch strategy, and tracking systems

Conduct expert workshop(s) to re-assess priorities and time lines as progress and new trends emerge

20-100 people

Data and analysis

Develop energy, environmental, and economic data to establish national baseline

Analyse future scenarios for energy and environment

Assess potential contributions of technologies to future energy, environmental, and economic goals

Conduct review and consultation cycles with key stakeholders; refine roadmap

Track changes in energy, environmental, and economic factors as roadmap is implemented

Time Required

1-2 months

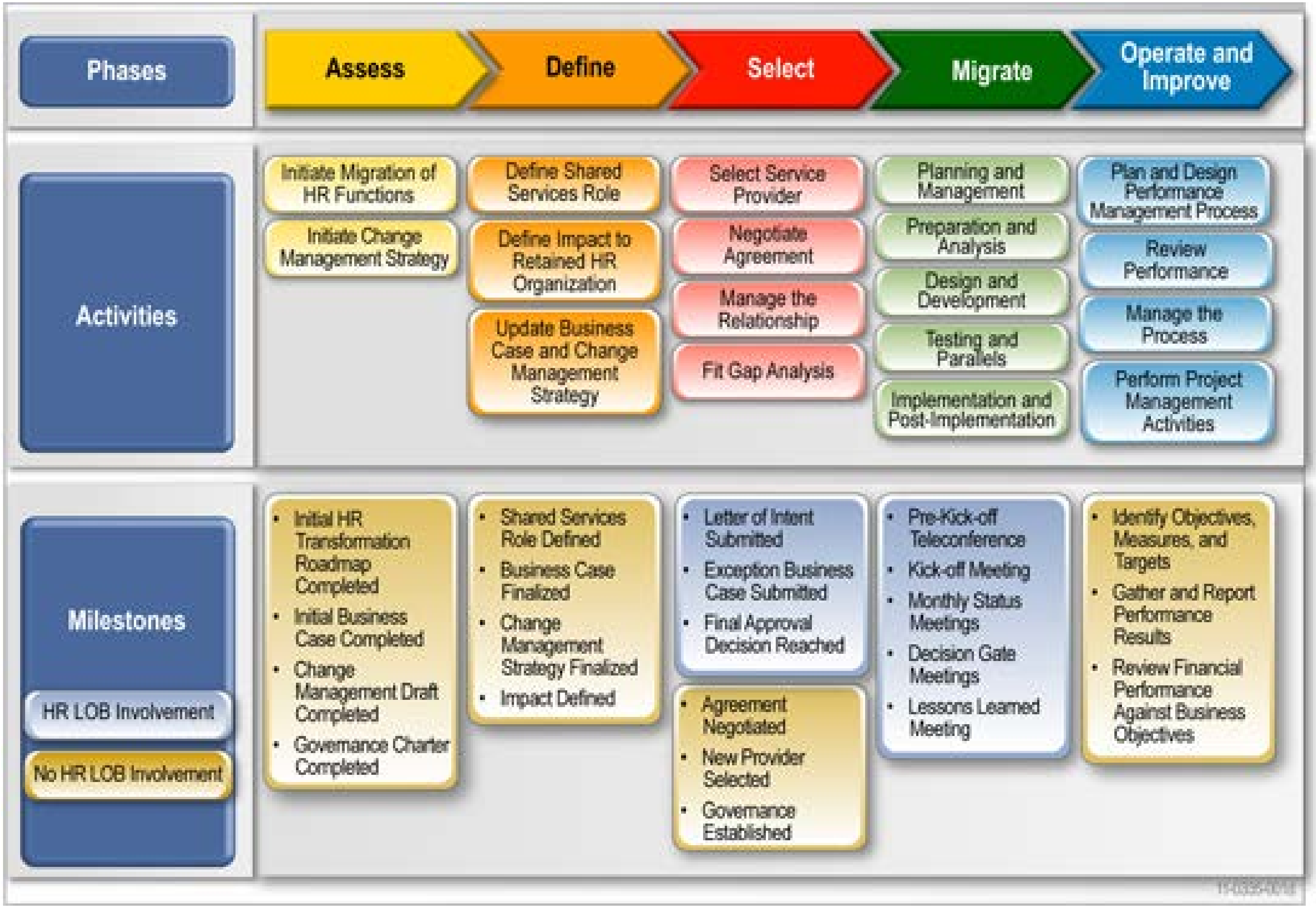
1-2 months

2-4 months

2-6 months

Recurring (1-5 years)

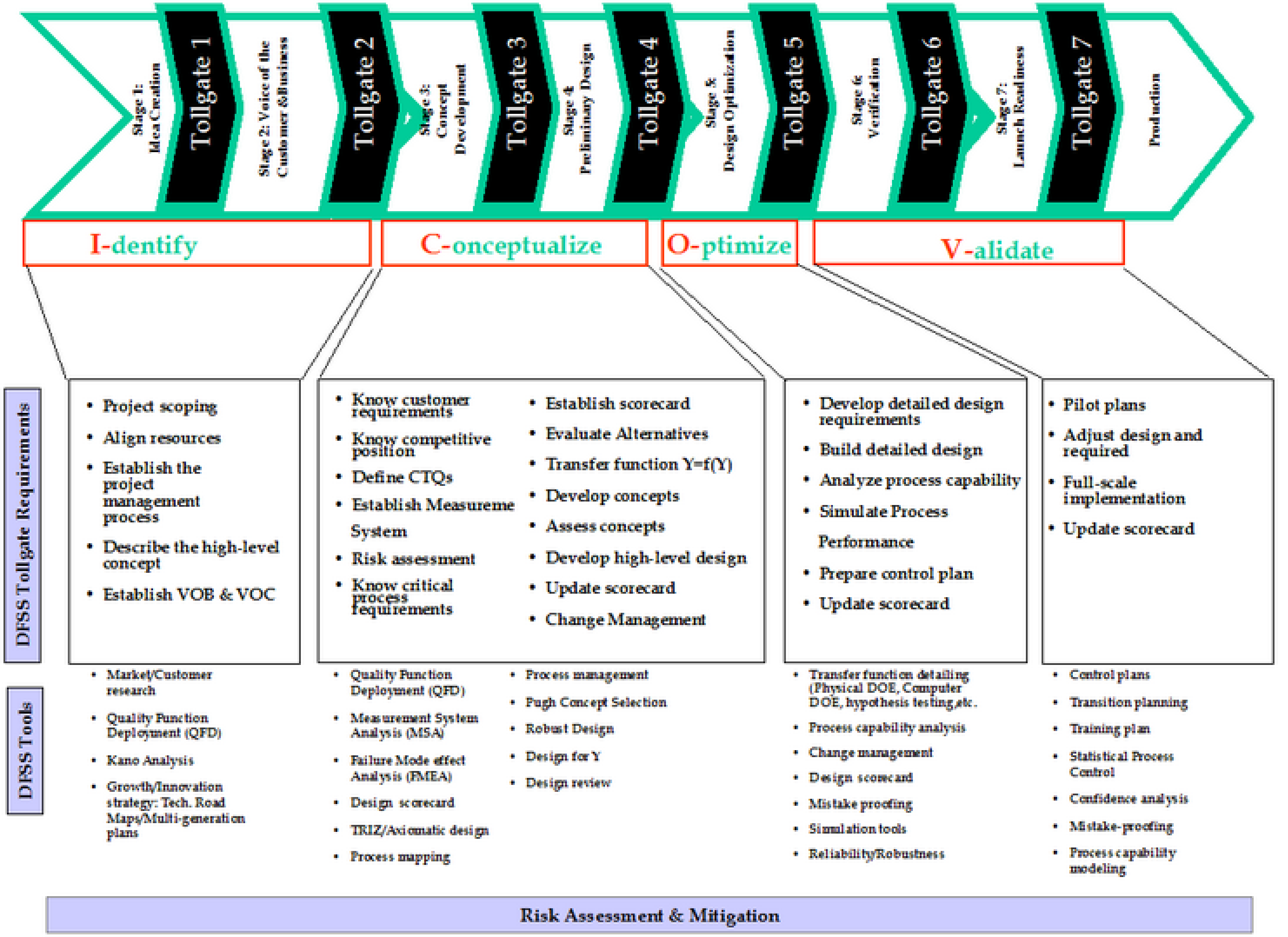
6-14 months total



Phases	Assess	Define	Select	Migrate	Operate and Improve
Activities	Initiate Migration of HR Functions Initiate Change Management Strategy	Define Shared Services Role Define Impact to Retained HR Organization Update Business Case and Change Management Strategy	Select Service Provider Negotiate Agreement Manage the Relationship Fit Gap Analysis	Planning and Management Preparation and Analysis Design and Development Testing and Parallels Implementation and Post-Implementation	Plan and Design Performance Management Process Review Performance Manage the Process Perform Project Management Activities
Milestones	• Initial HR Transformation Roadmap Completed • Initial Business Case Completed • Change Management Draft Completed • Governance Charter Completed	• Shared Services Role Defined • Business Case Finalized • Change Management Strategy Finalized • Impact Defined	• Letter of Intent Submitted • Exception Business Case Submitted • Final Approval Decision Reached • Agreement Negotiated • New Provider Selected • Governance Established	• Pre-Kick-off Teleconference • Kick-off Meeting • Monthly Status Meetings • Decision Gate Meetings • Lessons Learned Meeting	• Identify Objectives, Measures, and Targets • Gather and Report Performance Results • Review Financial Performance Against Business Objectives

HR LOB Involvement

No HR LOB Involvement



I-dentify | **C-onceptualize** | **O-ptimize** | **V-alidate**

DFSS Tollgate Requirements

I-dentify

- Project scoping
- Align resources
- Establish the project management process
- Describe the high-level concept
- Establish VOB & VOC

C-onceptualize

- Know customer requirements
- Know competitive position
- Define CTQs
- Establish Measureme System
- Risk assessment
- Know critical process requirements
- Establish scorecard
- Evaluate Alternatives
- Transfer function Y=f(Y)
- Develop concepts
- Assess concepts
- Develop high-level design
- Update scorecard
- Change Management

O-ptimize

- Develop detailed design requirements
- Build detailed design
- Analyze process capability
- Simulate Process Performance
- Prepare control plan
- Update scorecard

V-alidate

- Pilot plans
- Adjust design and required
- Full-scale implementation
- Update scorecard

DFSS Tools

I-dentify

- Market/Customer research
- Quality Function Deployment (QFD)
- Kano Analysis
- Growth/Innovation strategy: Tech. Road Maps/Multi-generation plans

C-onceptualize

- Quality Function Deployment (QFD)
- Measurement System Analysis (MSA)
- Failure Mode effect Analysis (FMEA)
- Design scorecard
- TRIZ/Axiomatic design
- Process mapping
- Process management
- Pugh Concept Selection
- Robust Design
- Design for Y
- Design review

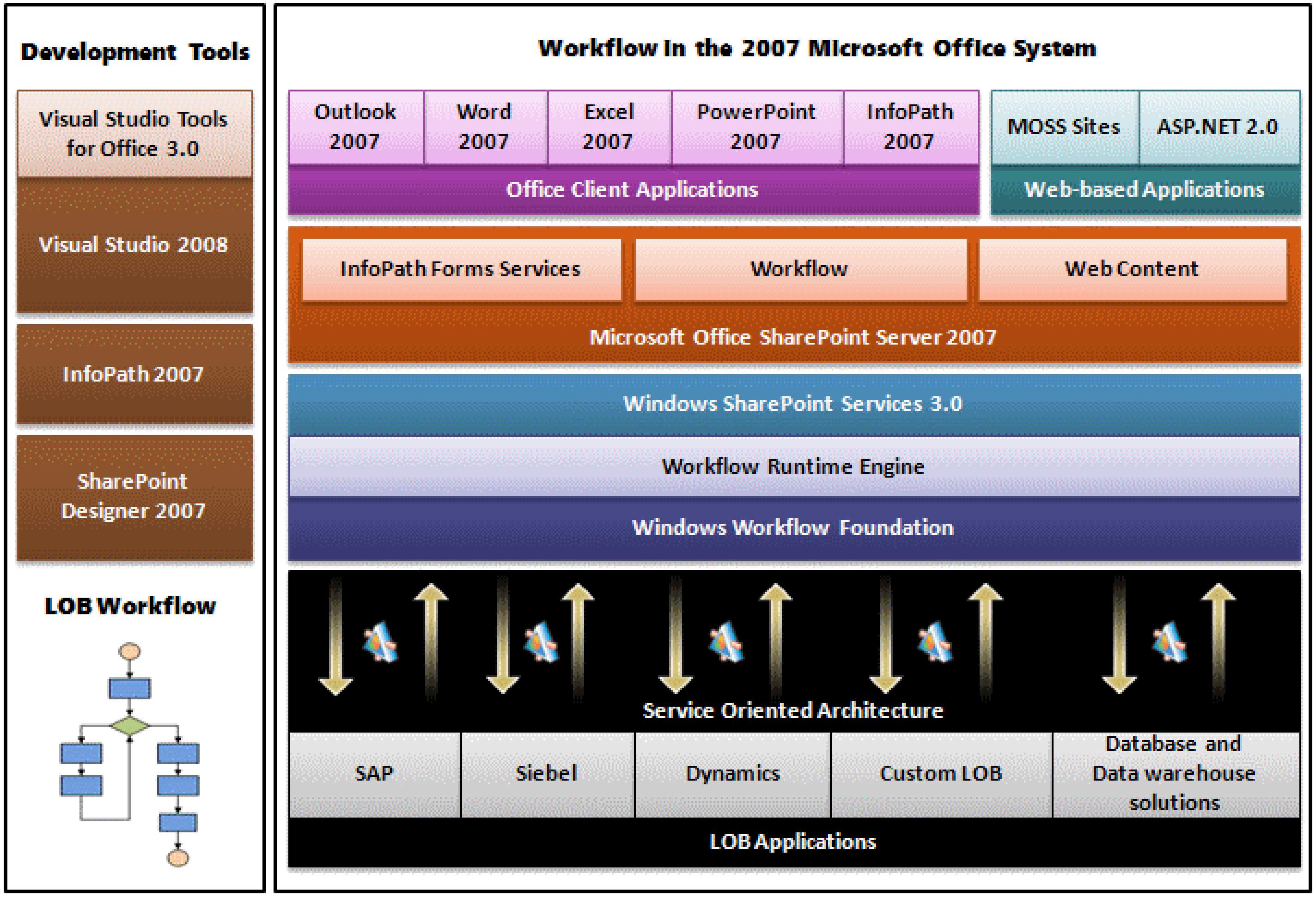
O-ptimize

- Transfer function detailing (Physical DOE, Computer DOE, hypothesis testing,etc.
- Process capability analysis
- Change management
- Design scorecard
- Mistake proofing
- Simulation tools
- Reliability/Robustness

V-alidate

- Control plans
- Transition planning
- Training plan
- Statistical Process Control
- Confidence analysis
- Mistake-proofing
- Process capability modeling

Risk Assessment & Mitigation


Development Tools
Visual Studio Tools for Office 3.0
Visual Studio 2008
InfoPath 2007
SharePoint Designer 2007
LOB Workflow
Workflow In the 2007 Microsoft Office System
Outlook 2007
Word 2007
Excel 2007
PowerPoint 2007
InfoPath 2007
Office Client Applications
MOSS Sites
ASP.NET 2.0
Web-based Applications
InfoPath Forms Services
Workflow
Web Content
Microsoft Office SharePoint Server 2007
Windows SharePoint Services 3.0
Workflow Runtime Engine
Windows Workflow Foundation
Service Oriented Architecture
SAP
Siebel
Dynamics
Custom LOB
Database and Data warehouse solutions
LOB Applications