ReSIST

Resilience for Survivability in IST

A European Network of Excellence

Information Society Technologies

SIXTH FRAMEWORK PROGRAMME

- Rationale
- Logic
- Joint Programme of Activities
- Partnership
- Organisation
- First year results

Rationale

(Reasonably) known: High dependability
for safety-critical or availability-critical systems

Avionics, railway signalling, nuclear control, etc.

Transaction processing, back-end servers, etc.

Continuous complexity growth

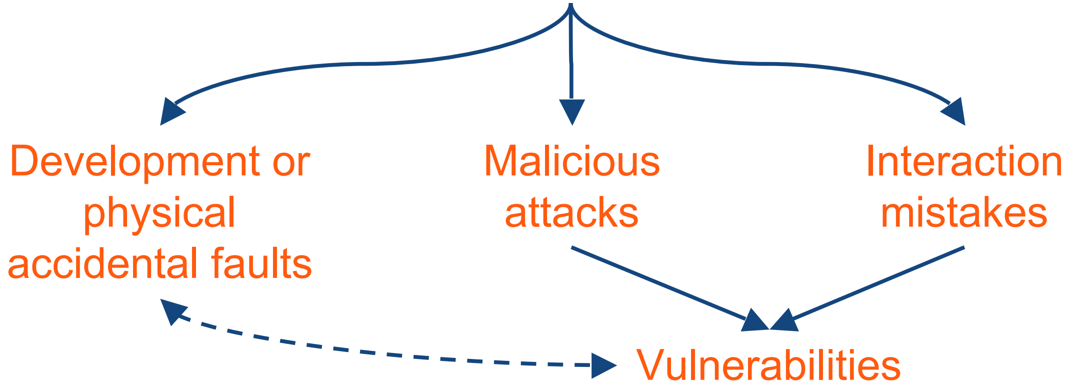
Large, networked, evolving, applications running on open systems, fixed or mobile,
i.e., *ubiquitous systems*

Dependability gap between necessary trust for realistic AmI and operational statistics

Scalability of Dependability

In addition to rigorous functional design, provision of

Resilience for Survivability

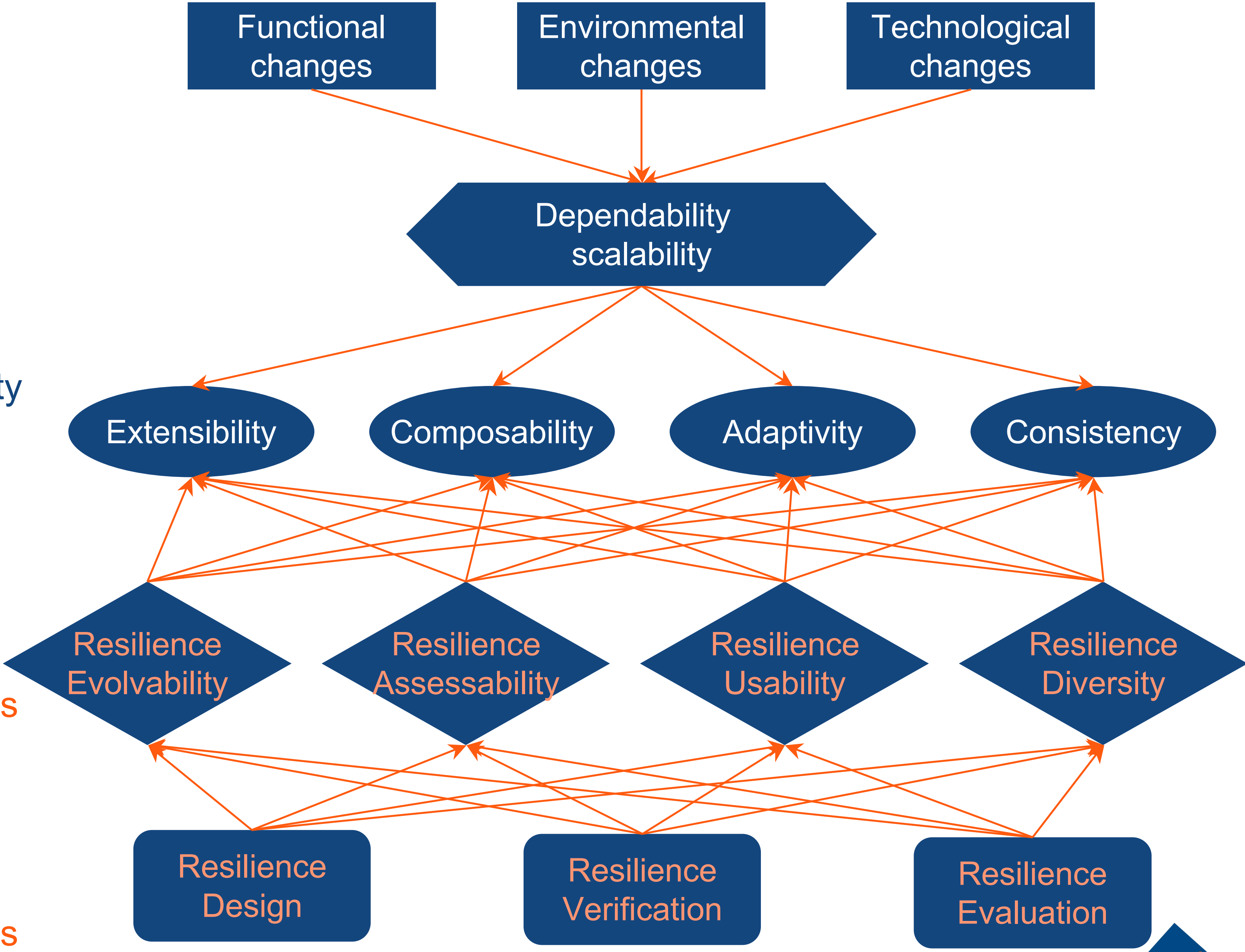


Development or physical accidental faults

Malicious attacks

Interaction mistakes

Vulnerabilities



Changes

Functional changes

Environmental changes

Technological changes

Dependability scalability

Dependability Scalability Properties

Extensibility

Composability

Adaptivity

Consistency

Resilience Scaling Technologies

Resilience Evolvability

Resilience Assessability

Resilience Usability

Resilience Diversity

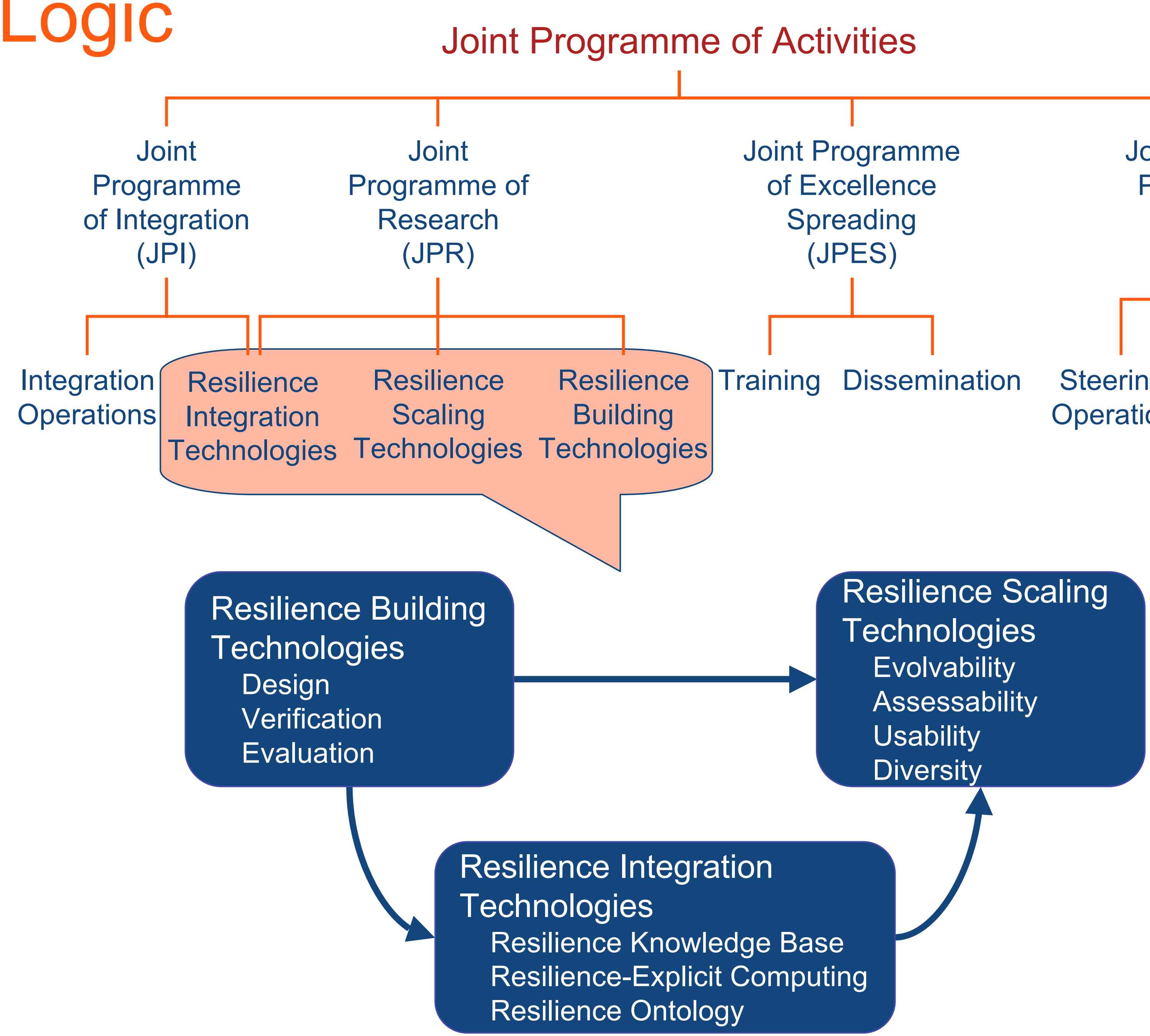
Resilience Building Technologies

Resilience Design

Resilience Verification

Resilience Evaluation

Logic



Joint Programme of Activities

Joint Programme of Integration (JPI)

Joint Programme of Research (JPR)

Joint Programme of Excellence Spreading (JPES)

Joint Steering Programme (JSP)

Integration Operations

Resilience Integration Technologies

Resilience Scaling Technologies

Resilience Building Technologies

Training

Dissemination

Steering-Operations

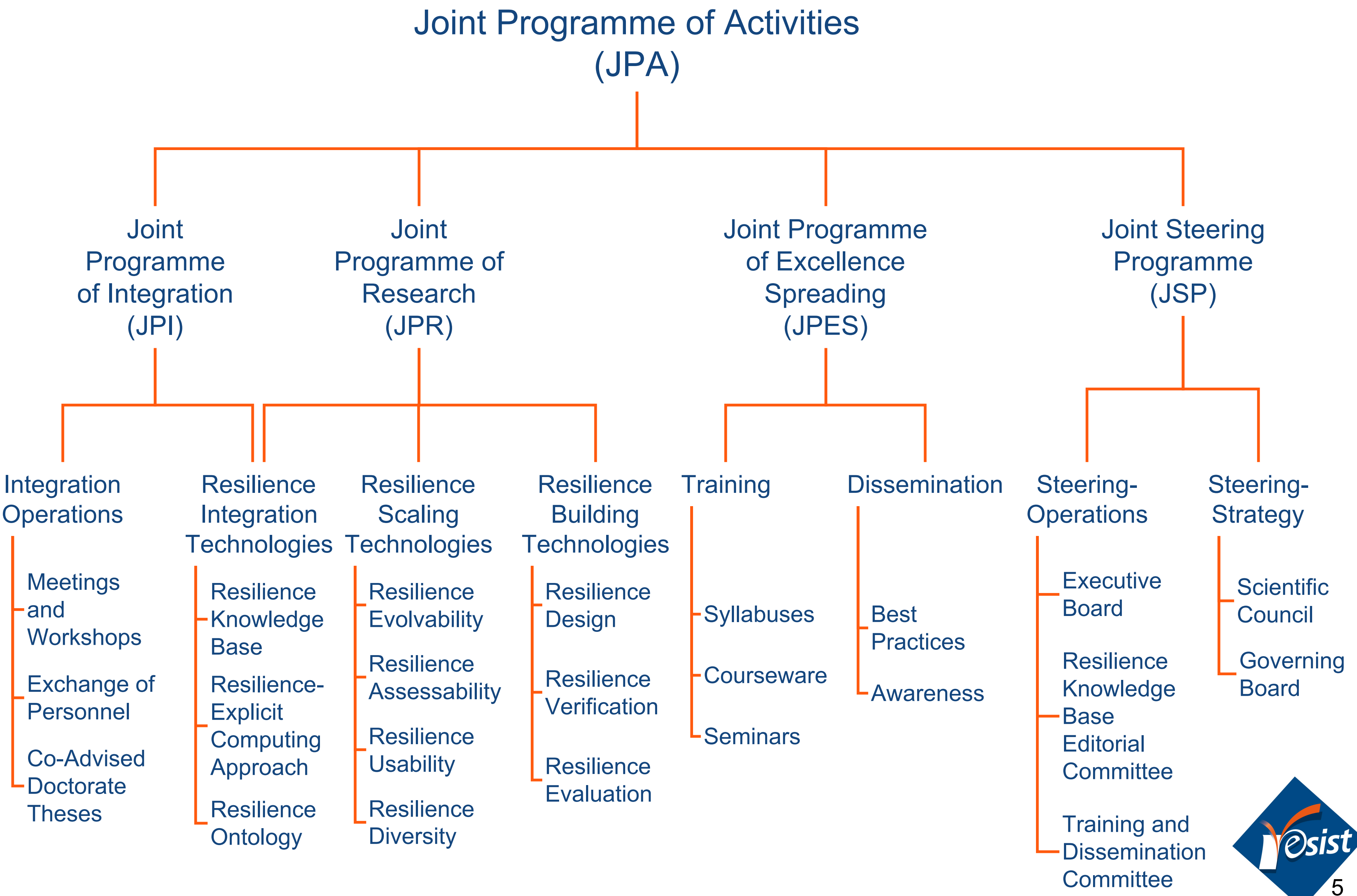
Steering-Strategy

Resilience Building Technologies
- Design
- Verification
- Evaluation

Resilience Scaling Technologies
- Evolvability
- Assessability
- Usability
- Diversity

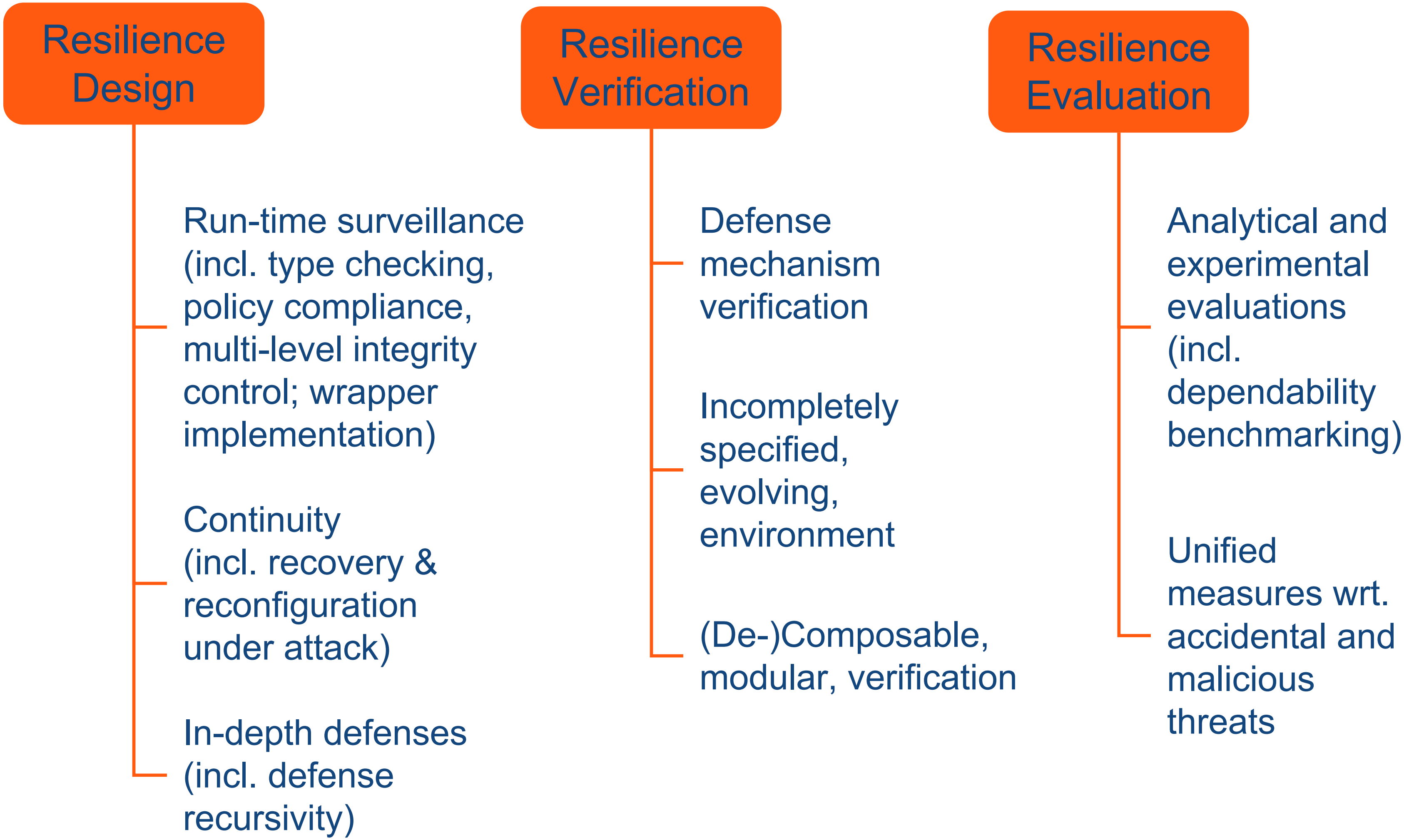
Resilience Integration Technologies
- Resilience Knowledge Base
- Resilience-Explicit Computing
- Resilience Ontology

Joint Programme of Activities



- Joint Programme of Activities (JPA)
  - Joint Programme of Integration (JPI)
    - Integration Operations
      - Meetings and Workshops
      - Exchange of Personnel
      - Co-Advised Doctorate Theses
    - Resilience Integration Technologies
      - Resilience Knowledge Base
      - Resilience-Explicit Computing Approach
      - Resilience Ontology
  - Joint Programme of Research (JPR)
    - Resilience Scaling Technologies
      - Resilience Evolvability
      - Resilience Assessability
      - Resilience Usability
      - Resilience Diversity
    - Resilience Building Technologies
      - Resilience Design
      - Resilience Verification
      - Resilience Evaluation
  - Joint Programme of Excellence Spreading (JPES)
    - Training
      - Syllabuses
      - Courseware
      - Seminars
    - Dissemination
      - Best Practices
      - Awareness
  - Joint Steering Programme (JSP)
    - Steering-Operations
      - Executive Board
      - Resilience Knowledge Base Editorial Committee
      - Training and Dissemination Committee
    - Steering-Strategy
      - Scientific Council
      - Governing Board

Resilience Building Technologies



Resilience Design

- Run-time surveillance (incl. type checking, policy compliance, multi-level integrity control; wrapper implementation)
- Continuity (incl. recovery & reconfiguration under attack)
- In-depth defenses (incl. defense recursivity)

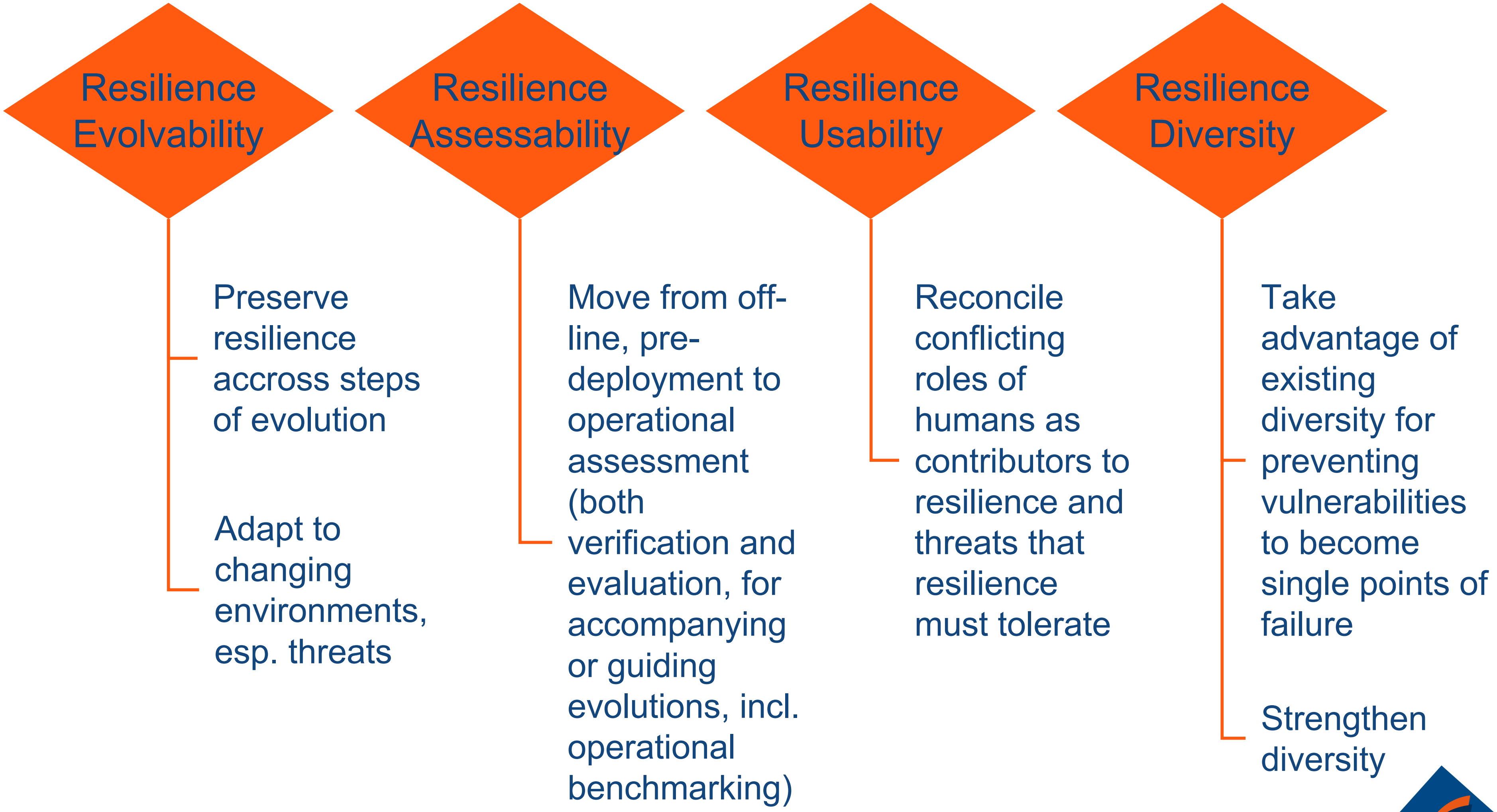
Resilience Verification

- Defense mechanism verification
- Incompletely specified, evolving, environment
- (De-)Composable, modular, verification

Resilience Evaluation

- Analytical and experimental evaluations (incl. dependability benchmarking)
- Unified measures wrt. accidental and malicious threats

Resilience Scaling Technologies



Resilience Evolvability

- Preserve resilience accross steps of evolution
- Adapt to changing environments, esp. threats

Resilience Assessability

- Move from off-line, pre-deployment to operational assessment (both verification and evaluation, for accompanying or guiding evolutions, incl. operational benchmarking)

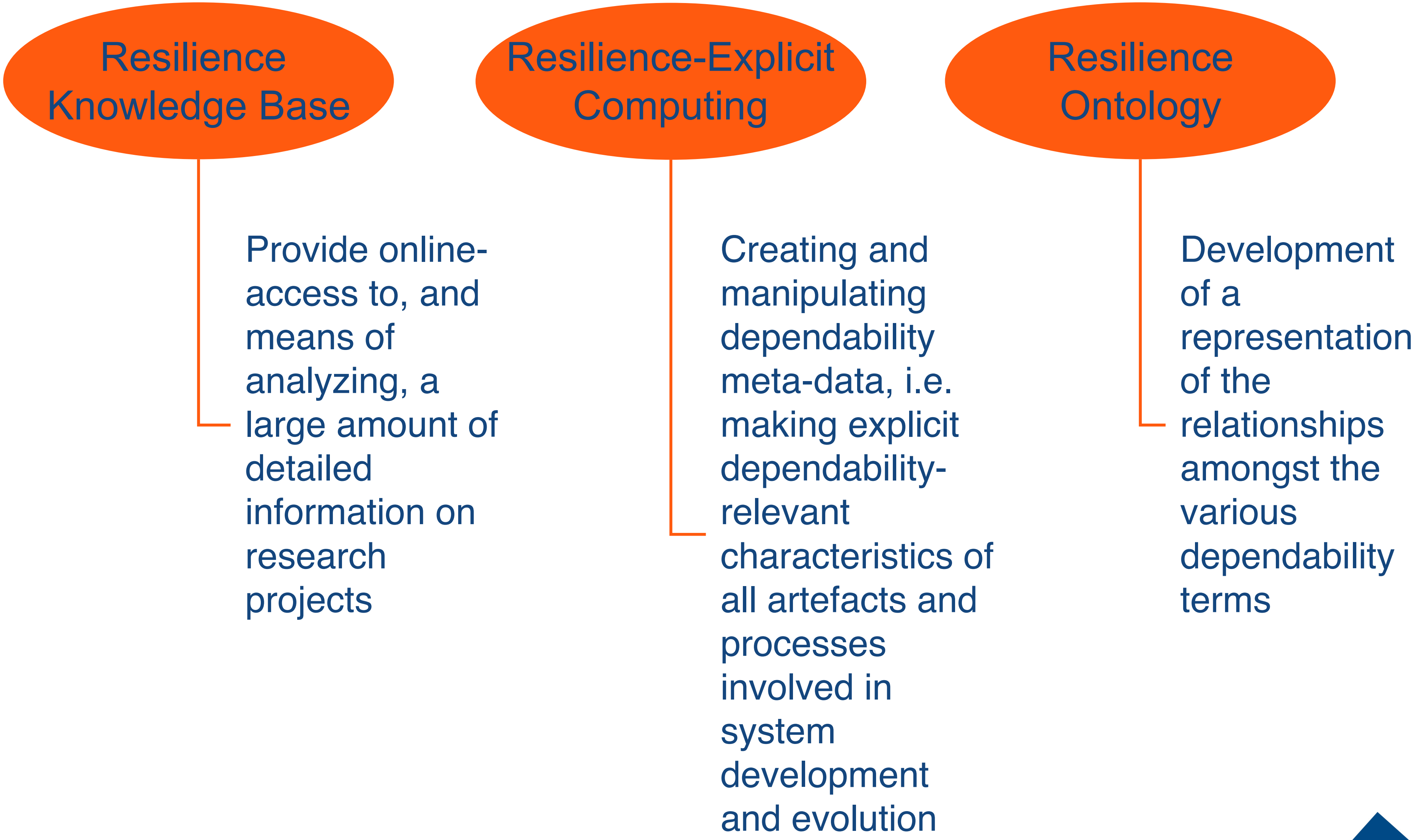
Resilience Usability

- Reconcile conflicting roles of humans as contributors to resilience and threats that resilience must tolerate

Resilience Diversity

- Take advantage of existing diversity for preventing vulnerabilities to become single points of failure
- Strengthen diversity

Resilience Integration Technologies



Resilience Knowledge Base

Provide online-access to, and means of analyzing, a large amount of detailed information on research projects

Resilience-Explicit Computing

Creating and manipulating dependability meta-data, i.e. making explicit dependability-relevant characteristics of all artefacts and processes involved in system development and evolution

Resilience Ontology

Development of a representation of the relationships amongst the various dependability terms

Partnership

	Expertise				Country	Academia (Ac) / Industry (Ind)
	Threat resilience: development or physical Accidental faults (A) / Malicious attacks (M) / Interaction mistakes (I)			Mobile computing		
LAAS-CNRS [coordinator]	A	M		X	FR	Ac
Budapest U.	A				HU	Ac
City U., London	A	M	I		UK	Ac
Darmstadt U.	A	M			DE	Ac
Deep Blue			I		IT	Ind - SME
Eurecom		M		X	FR	Ac
France Telecom R&D	A	M		X	FR	Ind
IBM Research Zurich		M			CH	Ind
IRISA	A			X	FR	Ac
IRIT			I		FR	Ac
Vytautas Magnus U., Kaunas	A				LT	Ac
Lisbon U.	A	M		X	PT	Ac
Newcastle U.	A	M	I		UK	Ac
Pisa U.	A	M	I		IT	Ac
QinetiQ	A	M			UK	Ind
Roma-La Sapienza U.	A			X	IT	Ac
Ulm U.	A				DE	Ac
Southampton U.	Resilience Knowedge Base building				UK	Ac

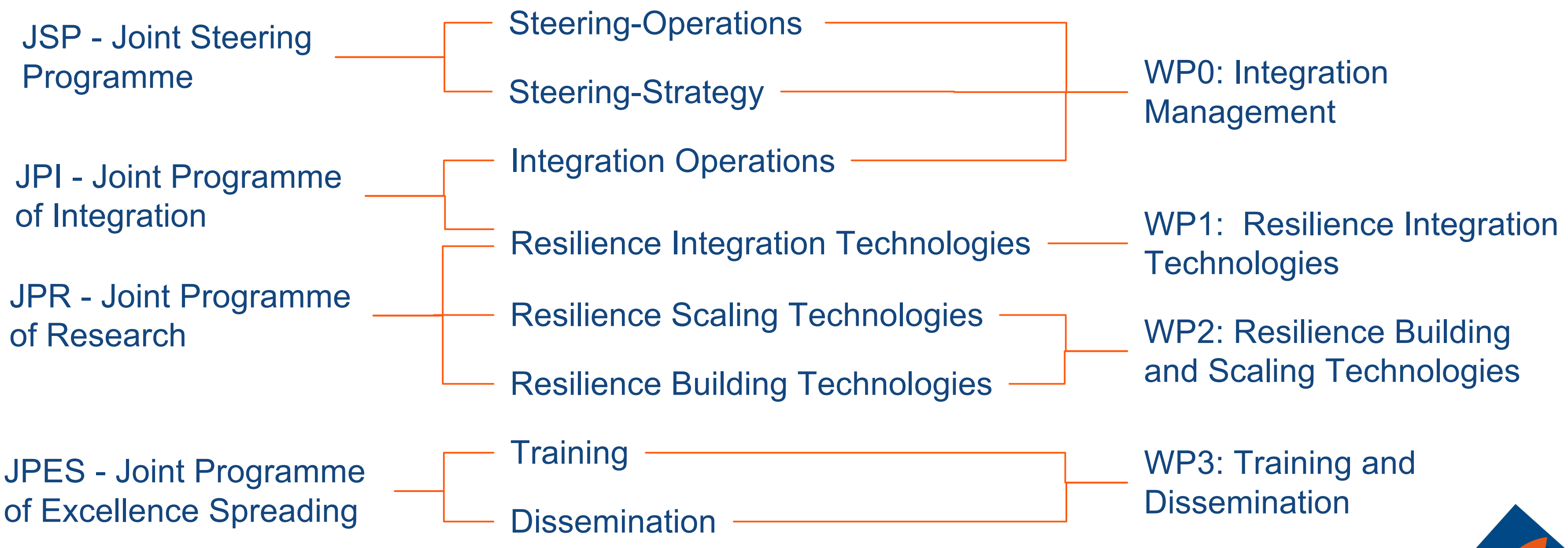
110 researchers plus 61 students, 3 year duration

Organisation

☞ Composition – Multidisciplinarity for holistic approach

Partners’ expertise — Threat Resilience		
Accidental faults	Malicious attacks	Interaction mistakes
13 [Ac: 11, Ind: 2]	10 [Ac: 7, Ind: 3]	5 [Ac: 4, Ind: 1]

☞ JPA - Workpackages



JSP - Joint Steering Programme

- Steering-Operations
- Steering-Strategy

JPI - Joint Programme of Integration

- Integration Operations
- Resilience Integration Technologies

JPR - Joint Programme of Research

- Resilience Integration Technologies
- Resilience Scaling Technologies
- Resilience Building Technologies

JPES - Joint Programme of Excellence Spreading

- Training
- Dissemination

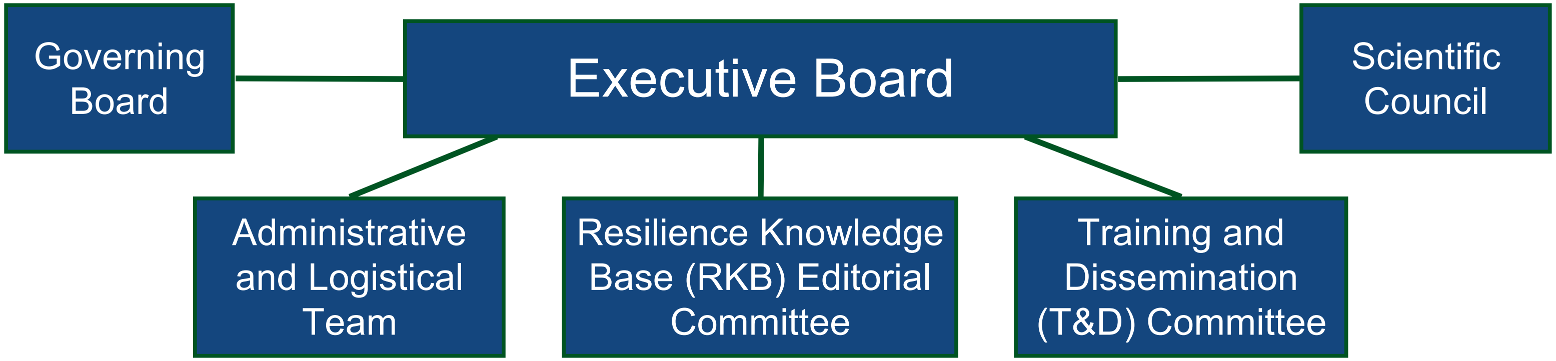
WP0: Integration Management

WP1: Resilience Integration Technologies

WP2: Resilience Building and Scaling Technologies

WP3: Training and Dissemination

Management



Governing Board

Executive Board

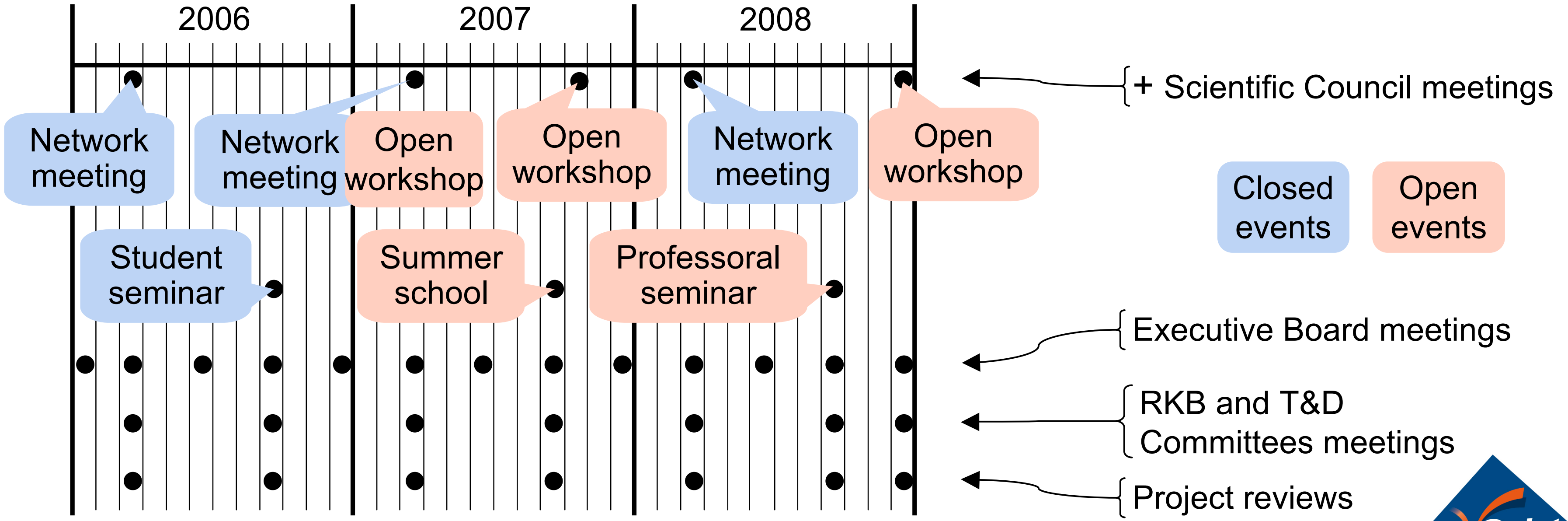
Scientific Council

Administrative and Logistical Team

Resilience Knowledge Base (RKB) Editorial Committee

Training and Dissemination (T&D) Committee

Event Schedule



2006

2007

2008

Network meeting

Network meeting

Open workshop

Open workshop

Network meeting

Open workshop

Student seminar

Summer school

Professoral seminar

+ Scientific Council meetings

Closed events

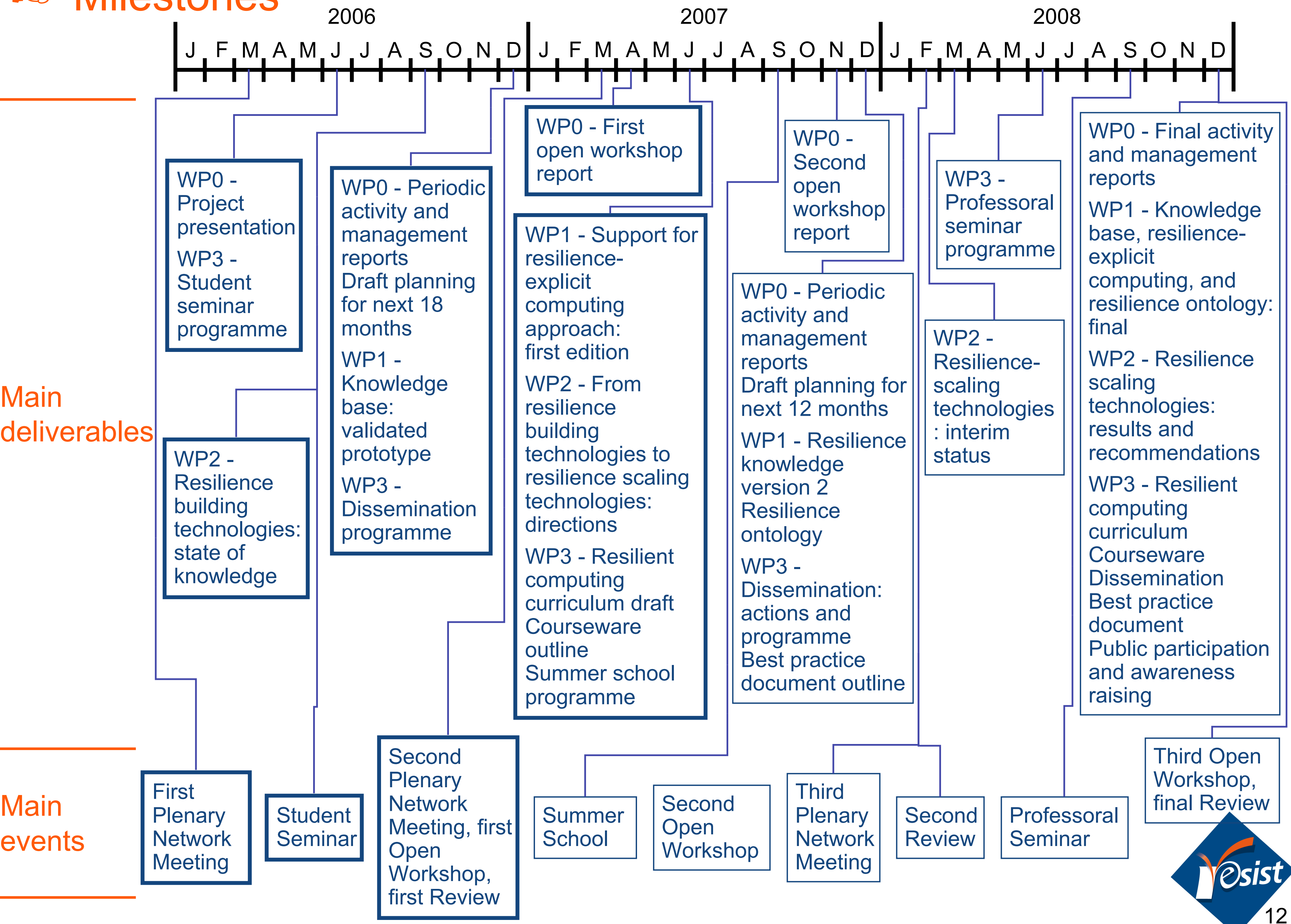
Open events

Executive Board meetings

RKB and T&D Committees meetings

Project reviews

☞ Milestones


2006
2007
2008
J F M A M J J A S O N D J F M A M J J A S O N D J F M A M J J A S O N D
Main deliverables
Main events

WP0 - Project presentation

WP3 - Student seminar programme

WP2 - Resilience building technologies: state of knowledge

WP0 - Periodic activity and management reports
Draft planning for next 18 months

WP1 - Knowledge base: validated prototype

WP3 - Dissemination programme

WP0 - First open workshop report

WP1 - Support for resilience-explicit computing approach: first edition

WP2 - From resilience building technologies to resilience scaling technologies: directions

WP3 - Resilient computing curriculum draft
Courseware outline
Summer school programme

WP0 - Second open workshop report

WP0 - Periodic activity and management reports
Draft planning for next 12 months

WP1 - Resilience knowledge version 2
Resilience ontology

WP3 - Dissemination: actions and programme
Best practice document outline

WP3 - Professoral seminar programme

WP2 - Resilience-scaling technologies : interim status

WP0 - Final activity and management reports

WP1 - Knowledge base, resilience-explicit computing, and resilience ontology: final

WP2 - Resilience scaling technologies: results and recommendations

WP3 - Resilient computing curriculum
Courseware
Dissemination
Best practice document
Public participation and awareness raising

First Plenary Network Meeting

Student Seminar

Second Plenary Network Meeting, first Open Workshop, first Review

Summer School

Second Open Workshop

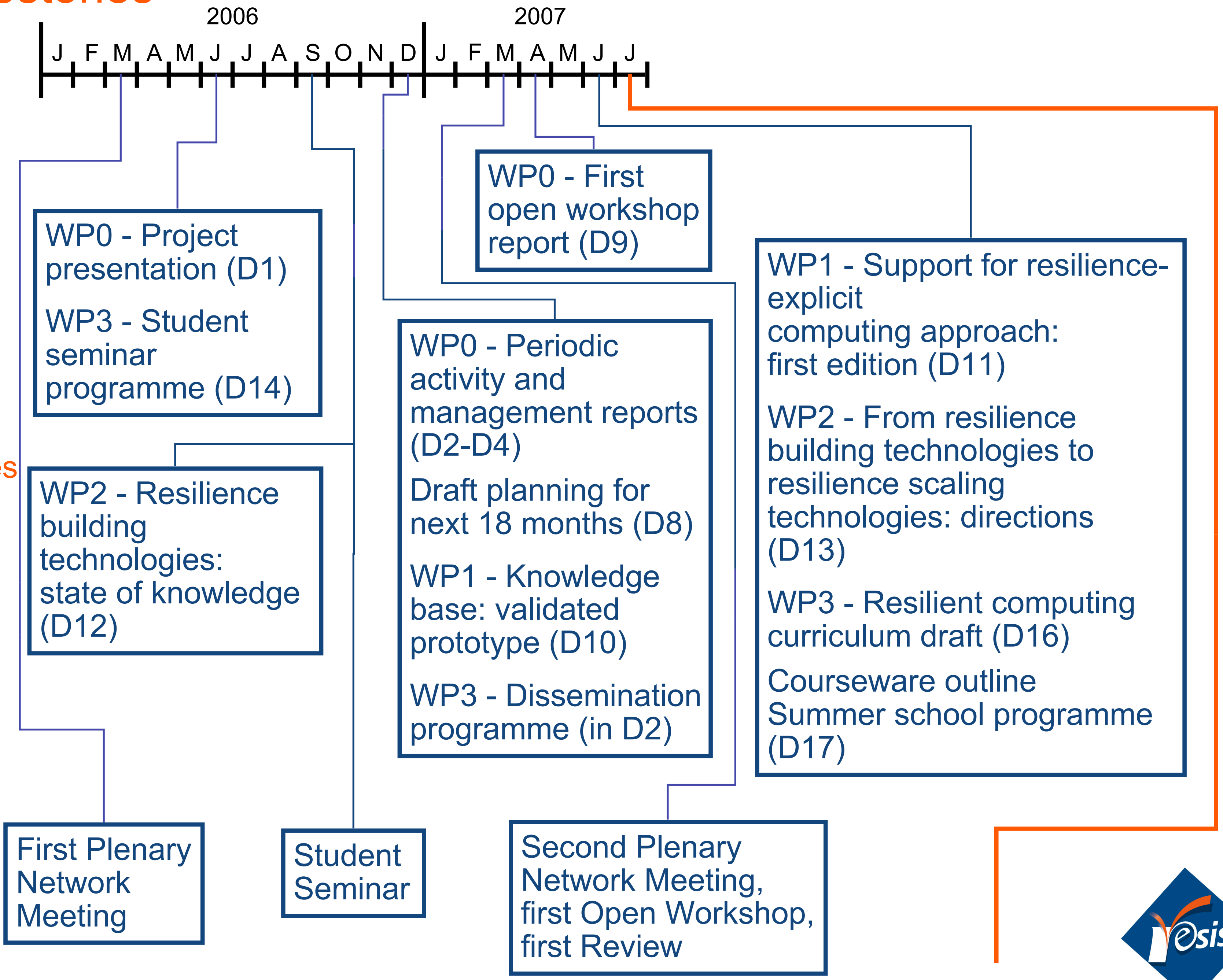
Third Plenary Network Meeting

Second Review

Professoral Seminar

Third Open Workshop, final Review

☞ Milestones



Main deliverables

WP0 - Project presentation (D1)

WP3 - Student seminar programme (D14)

WP2 - Resilience building technologies: state of knowledge (D12)

WP0 - Periodic activity and management reports (D2-D4)

Draft planning for next 18 months (D8)

WP1 - Knowledge base: validated prototype (D10)

WP3 - Dissemination programme (in D2)

WP0 - First open workshop report (D9)

WP1 - Support for resilience-explicit computing approach: first edition (D11)

WP2 - From resilience building technologies to resilience scaling technologies: directions (D13)

WP3 - Resilient computing curriculum draft (D16)

Courseware outline
Summer school programme (D17)

Main events

First Plenary Network Meeting

Student Seminar

Second Plenary Network Meeting, first Open Workshop, first Review

First year results

☞ Main Achievements

- State of Knowledge in Resilience-Building technologies
  - Main body
    - 5 parts (one per WG), 22 survey chapters
    - 68 co-authors from all ReSIST partners (54 researchers, 14 doctorate students)
    - Extensive review process, with emphasis on viewpoint of scientists who are not specialists of the sub-disciplines covered
    - A stepping stone in the process of integration
    - Substantial surveys that will be useful for the community at large
  - Appendices: Papers produced by ReSIST since January 2006

- Prototype Resilience Knowledge Base
  - A semantic web environment for effective access to a body of knowledge on resilience concepts, methods and tools
  - Current prototype: three classes of information, totaling 40 millions basic facts
    - Partners’ resilience data
    - External sources including CORDIS, NSF, Citeseer, ACM publications, RISKS
    - Two ontologies: Dependability and Security, Systems concepts
  - Information access enables relationships between entities to be displayed in the form of Communities of Practice
  - Prototype reviewed by all ReSIST partners, and updated in response to feedback

☞ Significant events and advances

- Initial plenary meeting of the network (LAAS, 21-23 March), 101 ReSIST participants
- Student Seminar (San Miniato, Italy, 5-7 September), 32 Doctorate Students and 15 Senior Members
- Personnel exchange for at least one month stays, 5 ReSIST members, totalling 17 months of stay
- Co-advising of 4 doctorate theses.
- Production of 8 articles in scientific journals, and presentation of 52 communications (texts in proceedings)
- Presentation of ReSIST at 11 national, European and international events.

☞ Preparatory ground work

- Coming events, esp.
  - Open Workshop, 21-22 March, Budapest
  - Summer School, 24-28 September 2007, Porquerolles island
- Deliverables
  - Research Agenda, *From Resilience-Building to Resilience-Scaling Technologies: Directions*
  - Resilience-Explicit Computing Approach
  - Best Practice Document
  - Curriculum in Resilient Computing