Tutorial #1

NICE
MAY 2025

Theme
Business Models for SME in the AI Era

NexComm 2025 & DigitalWorld 2025

Meet Petre

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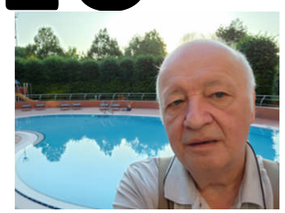
Lecturer

Prof. Dr. Petre Dini, IARIA, USA/EU



PETRE – AI-related activities

VALENCIA
November 2023

Petre DINI
petre@iaria.org

- Petre: 1980/90
  - Fuzzy-based resource allocation, Automatic knowledge incorporation, CAD/CAM Expert Systems,
  - Real-time embedded systems, Space/time thinking and processing, Multi-layers context-based meaning
- Petre: 1992: The First ITC Conference (Montreal), tutoring systems, self-adaptable Q&A professor-student systems (advanced Chatbots)
- Petre: 1997 Dartmouth, Mobile Intelligent Agents (Intelligent Grasshopping Polling)
- Petre: 1997-2000: Nomadic code, Mobile agents, (Grasshopper EU project)
- Petre: 2000-2010: Autonomous systems, Policy-driven systems, Intelligent systems (pushed to Patents, ITU, TMF, standards)
  - Capturing emerging properties, Variable pooling frequency, Self-adaptable decision polices, Reflexive-policies (Digital-Twins)
  - Routers embedded-AI (temporal logic in Syslog processing, policy-driven signal processing)
- AI-driven Selection of Content Servers based on Current Server Availability (dynamic availability, heuristics, real-time)
- Petre: 2010 - now (active observer and critic, panels, open discussions)

At large: http://www.iaria.org/fellows/PetreDini.pdf

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Themes

Modus operandi in the pre-AI era

Challenges of classical models

Modus operandi using AI-based tools/platforms/approaches

Challenges in AI era; platform/tools (LLMs) harmonization

AI-related corporation skills; agility, licensing

AI-related employee skills; knowledge engineer

Modus operandi in the pre-AI era

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Decision-Making Style
Operational Schema
Technology Use
Customer Engagement
Workforce and Skills

Experience-driven: Decisions based on intuition, owner/founder expertise, and historical performance.
Flat hierarchy: Quick decision loops with minimal bureaucratic overhead (centralized in the hands of a small leadership group).
Reactive (vs predictive) business model: Response to market signals and crises were rather defensive.

Manual and human-centric processes:
Customer relations handled via direct contact, phone, or email.
Inventory, sales, and financial records often managed in spreadsheets or paper-based ledgers.
Departmental silos: Functions like marketing, sales, and operations were loosely integrated
Low data dependency: Limited data collection, minimal analytics—decisions were made with incomplete or aggregated data.

Relationship-based loyalty: Success depended on trust, proximity, and personal service rather than algorithmic targeting.
Word-of-mouth marketing: Branding was local and reputation-driven, with low-scale advertising.

Generalist staff: Employees often wore multiple hats with broad but shallow skill sets.
Low digital literacy: Training was ad hoc, and digital tools were only used when necessary.

Basic IT tools:
Use of desktop software like Microsoft Office (Excel, Word, Access).
Basic accounting and point-of-sale systems.
Minimal automation: Repetitive tasks were done manually; automation was costly or inaccessible.
Limited digital presence: Many SMEs had static websites, if any, with low adoption of e-commerce or digital marketing.

Schema and Challenges

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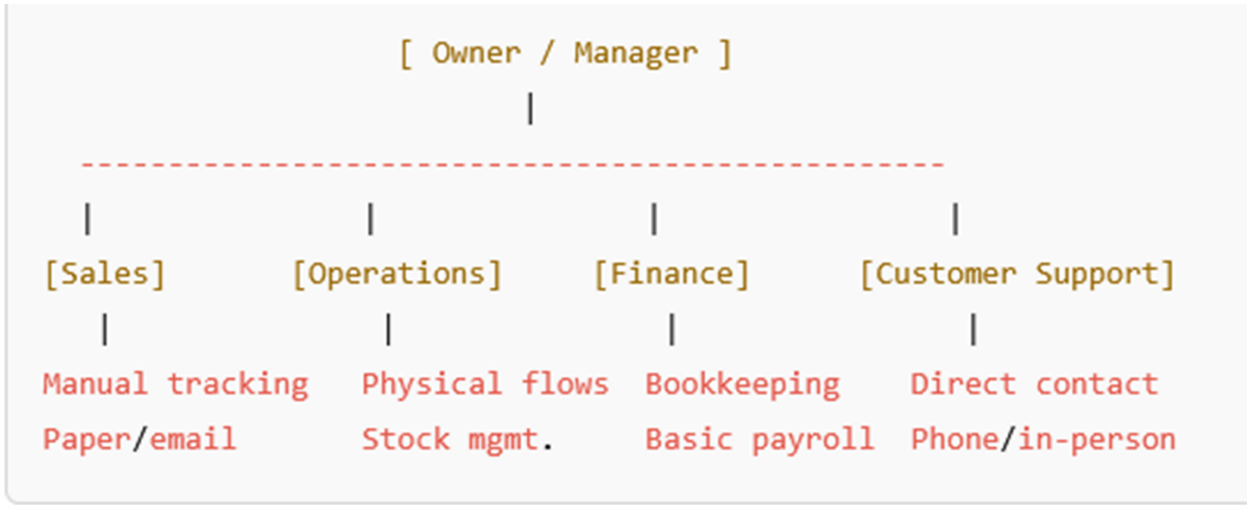

Support Tools

MS Office Suite
On-premise hardware (printers, servers)
Local storage (files, backups)

Data Flow

Minimal, unstructured, delayed (days/weeks)

Challenges

Investors: Single point-of-failure syndrome
Strategy
Marketing
Business continuity
Market predictions
Innovation
Personnel retention

AI-concepts?

Flexible approach

Q: Risky

Pre-AI vs Digital/Post-AI

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Dimension
Decision-Making Experience-based, intuition-driven, reactive || Data-informed, predictive, AI-assisted (dashboards, recommender systems)
Business Strategy Survival/growth based on local niche, slow adaptation || Agile, data-driven models, leveraging AI insights for scalability
Process Management Manual, spreadsheet- or paper-based tracking || Workflow automation, robotic process automation (RPA), smart process orchestration
Customer Engagement Personal interaction, word-of-mouth loyalty || AI-powered chatbots, personalization engines, CRM with sentiment analysis
Marketing & Sales Static website, local ads, generalist campaigns || SEO/SEM, social media analytics, targeted ads via ML models
Product/Service Design Based on owner vision or past feedback || Real-time feedback analysis, A/B testing, demand prediction via AI
IT Infrastructure On-premise systems, minimal integration || Cloud-native platforms, APIs, scalable digital ecosystems
Data Handling Little to no structured data use || Real-time data pipelines, analytics dashboards, predictive models
Financial Management Bookkeeping via spreadsheets or basic tools || AI-based forecasting, fraud detection, dynamic pricing models
HR & Workforce Skills Generalists with manual task focus || Roles evolving to human-AI collaboration, upskilled digital-savvy staff
Supply Chain Local suppliers, limited traceability || AI-optimized logistics, dynamic sourcing, real-time supply chain monitoring
Innovation Capability Low (due to cost and risk aversion) ||| Open innovation, AI for prototyping, fast feedback loops
Security & Compliance Manual checks, low-level awareness || AI-driven anomaly detection, compliance automatio

… the outcome

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Loosing control/ownership

On-demand tools (license, versioning, product ownership)

Need on narrow (and quickly evolving/changing) skills

Quick deskilling

Highly dependent on critical resources (human and digital)

Offer a tailored product/service built on top of proven components, with added value in customization, domain expertise, or integration.

Infrastructure/Tools	Licensed APIs (e.g., OpenAI, Anthropic), FOSS under LGPL/MIT, or open-core systems
Intelligence Layer	LLMs, vector DBs, autoML platforms licensed per-use or hosted
Proprietary Layer	SME-developed: workflow orchestration, UX, domain-specific logic, rule-based modules

Revenue Stream and Licensing

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Revenue streams

- B2B Licensing — License the system as a SaaS or on-prem platform (monthly/annual tiers)
- Customization Services — Custom workflows or modules tailored to client processes
- API as a Service — Expose SME-layer functionality via custom APIs
- Integration Add-ons — Plugins for CRMs, ERPs, sector-specific software (education, law, medical)
- Analytics / Reporting — Premium dashboards or compliance modules

CRM Customer Relation Management

ERP Enterprise Resource Planning

Licensing strategy

Use tools under licenses that allow derivative/commercial work or that are “as-a-service” (API-based)

Tool Type	*Example*	*SME Strategy*
LLMs	OpenAI, Claude, Cohere	Use via API – no model redistribution
Open-source libs	spaCy, HuggingFace, FastAPI	Comply with licenses (MIT/Apache = safe)
Open-core	LangChain, Supabase	Use core, pay for commercial support if needed
Cloud APIs	AWS Comprehend, Azure ML	Usage-based costs; no IP lock-in

Be careful with:

GPL code (may require open-sourcing your product)

Redistributable binaries if licensing terms are restrictive

GNU GPL: General Public License (GPL)

TP-LINK GPL code: Third Party : partly contain software code developed by third parties, including software code subject to the GNU General Public Licence (“GPL“), Version 1/Version 2/Version 3 or GNU Lesser General Public License("LGPL")

Ownership Map / Benefits

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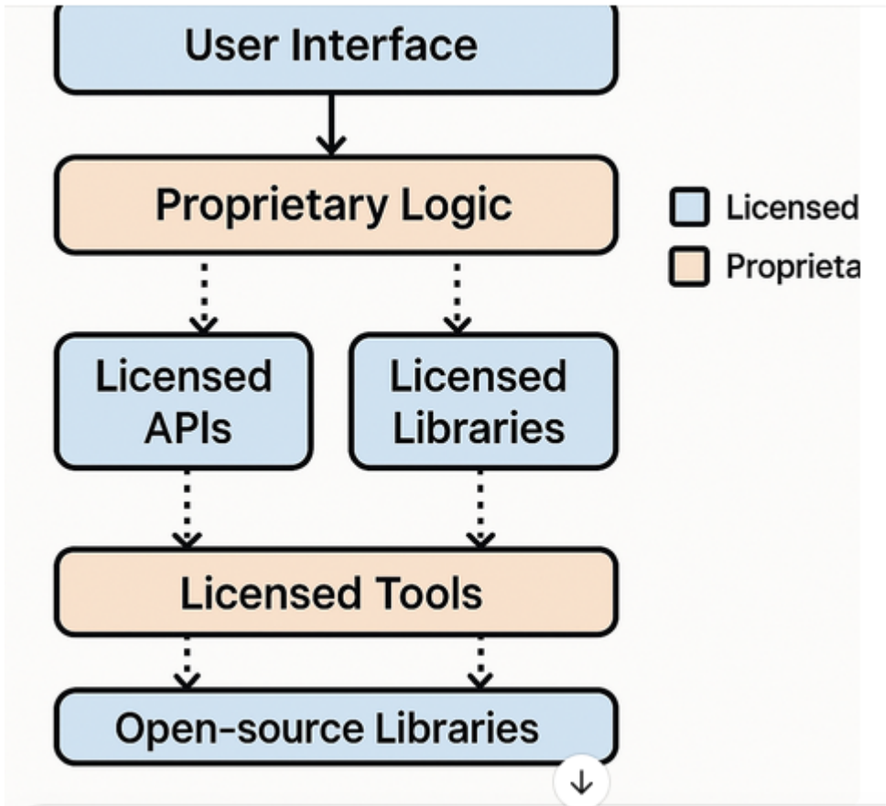
Ownership

Component	*Ownership*
User interface, workflow logic	Fully SME-owned
Prompt engineering / orchestration	SME-defined
Models (if via API)	Not owned – licensed
Conceptual IP (how system works)	Ownable + protectable

Strategic Benefits

Benefit	*Outcome*
Focus on core value	SME builds what matters most: domain logic, UX, compliance
Faster time-to-market	Reuse of proven tools reduces dev overhead
Controlled costs	Pay-as-you-grow API or license usage
Maintain IP	SME owns workflow, brand, integration layer
Upgradeable backend	Swap tools as better ones emerge



Roles / Skills / BU Size

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Roles

Role	*Responsibility*	*Team Size*
AI Architect / Engineer	Designs how to integrate APIs, models, and internal logic	1–2
Prompt/Task Designer	Engineers LLM prompts, evaluates model behavior, controls cost & quality	1
Domain Expert / Product Owner	Defines real user needs, validates utility, tracks licensing constraints	1
Full-Stack Developer	Builds the interface, workflow, and connections to libraries/APIs	1–2
Data/Compliance Advisor (part-time or external)	Ensures licensing/legal/safety boundaries are respected	Optional/external

Core Skills Matrix

Skill Area	*Concrete Skills*	Why It's Needed
Model Awareness	Know top LLMs (GPT-4, Claude, Cohere, Mistral, LLaMA), licensing, strengths, limits	To select and justify model usage, e.g., open vs API vs local)
Prompt Engineering	Few-shot prompts, chain-of-thought, reasoning control, role setting	To shape behavior and optimize API efficiency
Tool Integration	Use of LangChain / LlamaIndex / OpenAI API / HuggingFace / vector DBs	To glue tools together into working pipelines
Basic Concept Modeling	Concept extraction, graph building (e.g., Neo4j, RDF-lite)	If adding a concept layer (LCM), for structure and reasoning
Evaluation Design	Know how to assess output quality (fluency, truth, domain fit)	So your system doesn't hallucinate or mislead users
Licensing/Legal	Understand commercial rights of APIs, open source, data policies	To avoid IP or compliance risk
Human-Centered Thinking	Lean UX principles, feedback loops	To validate product-market fit early and cheaply

Effectiveness / Product Team

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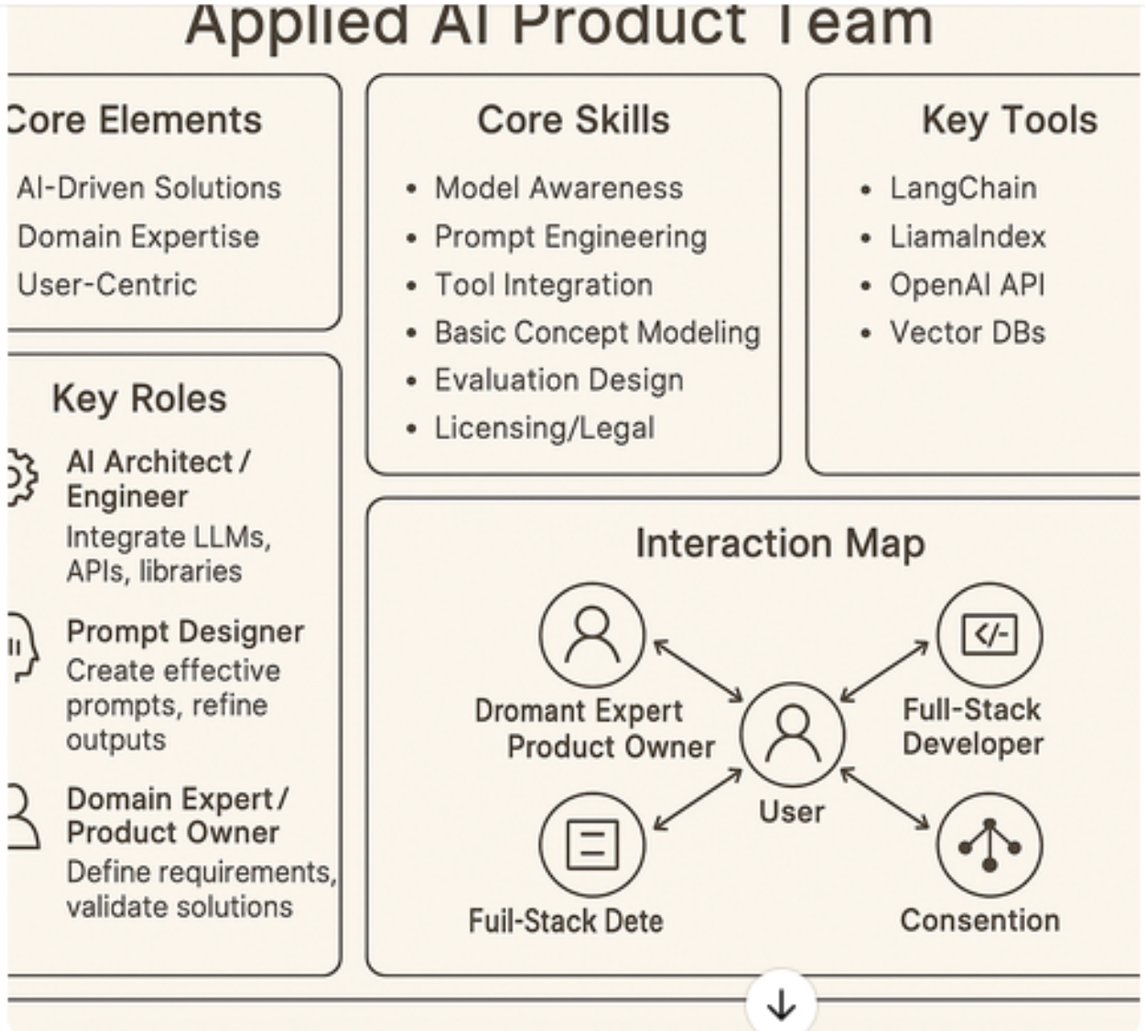
How to Stay Lean Yet Effective

Strategy	*Description*
Use modular open-core	Don't reinvent embeddings, chains, vector stores — use LangChain, Supabase, etc.
Start with one model family	Choose GPT or Claude as your "core" and test others only when needed
Reuse templates and evaluators	Use prompt collections, eval chains (e.g., Ragas, Trulens)
Human-in-the-loop	Design feedback capture early (annotation, correction, thumbs-up/down)
Pair with strong domain expert	Even better than tuning models is tuning the workflow logic and vocabularies



Roles / Tools / Licensing

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Team Roles & Assignments

Role	*Name / Notes*	*Time Allocation*
🧠 AI Architect	/ Engineer	Full-time / Part-time
✍️ Prompt Designer	/ Evaluator	
🧩 Domain Expert	/ Product Owner	
💻 Full-stack Developer		
⚖️ Legal	/ Compliance Advisor (optional/external	

Core Tools & Frameworks

Tool Type	*Selected Tool*	*Why This Tool?*
LLM API	(e.g., OpenAI GPT-4, Claude, Mistral)	
Concept Engine	/ Graph	(e.g., Neo4j, RDF)
Prompt Chains	/ Lang	(e.g., LangChain, CrewAI)
Embedding Store	(e.g., Chroma, Pinecone, FAISS)	
UI	/ App Framework	(e.g., React, Streamlit, FastAPI)

Iteration & Evaluation Plan

Evaluation Focus	*Approach / Metric*	*Frequency*
Output Quality	Human eval + metrics (BLEU/Faithfulness)	Weekly
User Feedback	Real-user pilot, scorecards	Monthly
Cost Optimization	Token usage monitoring	Every sprint

Risk & Licensing Checklist

Area	*Action Required*	*Status*
API Terms	Review commercial use terms	☑
Data Privacy	Compliant with GDPR / local regs	☐
Open Source	Track LGPL/GPL obligations	☐
Prompt/IP Boundaries	Avoid sensitive reuse	☐

Summing-up: Knowledge Engineer

Note: a paradigm shift where traditional roles (e.g., software architect, QA analyst, DB admin) are morphing or being recomposed into fluid, cross-functional profiles in response to:

- LLM integration
- Tool orchestration instead of ground-up building
- Semi-autonomous agents replacing hard-coded pipelines
- New licensing/compliance terrains
- Cognitive layer design (prompt logic, concept graphs, task decomposition)

A “developer” today might need to think like a knowledge engineer, while a “product owner” now needs to understand model reasoning boundaries.

Q

FYI (on licensing):

https://developer.nvidia.com/blog/curating-trillion-token-datasets-introducing-nemo-data-curator/

Curating Trillion-Token Datasets: Introducing NVIDIA NeMo Data Curator