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# Startup Village 2015

## Technology trends sessions extracts



## Technology trends discussed at Startup Village 2015, Skolkovo, Moscow:

1. Internet of Things - Myths and Reality
2. Innovative IT solutions for finance
3. Space trends. Opportunities for science and business
4. New technologies in modern manufacturing: trends and challenges
5. Innovation approaches to defending against cyber threats
6. Laser and Radiation Technologies. Changing Industries and the Quality of Life
7. Mass Media & Telecom - A Glimpse into the Future
8. Cell Technologies and Regenerative Medicine
9. Surgery of the future: robotics and virtual reality
10. Challenges in cancer control
11. Smart cities



# 1. Internet of Things - Myths and Reality



**Drivers:** In 2008, the number of devices connected to the Internet, exceeded the number of people on Earth. By 2020, there will be 50 bln connected devices. Beyond 2016, IoT will worth more than \$3 tln in value creation potential.

## **Technology trends, enabling Internet of Things:**

Sensors in everything; networks omnipresent; ability to measure and analyse everything.

Wearables: by 2020 40-50 bln devices, 10 wearable connected devices per each human being.

First “validations” of IoT: Driverless car (e.g. Google’s); Fleet Management (e. g. Fleetmatic); Smart Building Energy Management Systems (e.g. Schneider); \$3.2 Billion Thermostat by Nest (Apple); Tesla home battery; various wearable devices (wearables market is projected to reach \$6-\$12 Billion by 2018).

## **Russian outlook:**

Level of internet penetration is critical for IoT development. In Russia broadband connection will be delivered to all localities populated by over 250 people according to governmental initiative. Russian IoT market is prepared for considerable growth, fuelled by state corporations’ demand. In the end of 2014, Skolkovo Foundation has launched a comprehensive program to support Russian technology entrepreneurs in IoT.



## 2. Innovative IT solutions for finance



**Drivers:** ever increasing people mobility, widespread of smart devices, switch to mobile platforms. The use of paper money (cash) is decreasing in western countries, in the UK 52% almost never use cash, Norway is getting fully e-money country soon. Internet banks penetration levels in the world vary 30-80%. Generation of “digital native” is coming up. Retail and banking are merging. 2014 has shown \$14 bln VC investment into Fintech (tripled in one year) the number is expected to grow further to \$40bln by 2020. Apple and Samsung bet on fintech (mobile wallets/payments).

**Technology trends:** Finance is at the vanguard of global data processes development and standartization. Technology is leveraged to improve process efficiency, identifying opportunities to automate transaction processing beyond the shared service centre and into systems-based solutions. Usability, peer-to-peer loans and big data analytics are major trends. MPOS is the fastest growing sector.

**Russian outlook:** Internet banking penetration in Russia is 27,3%. Mobile payments is the fastest growing sector. Russian market currently expanding thanks to B2C projects, B2B is coming soon, big room for improvement in efficiency of financial institutions. Decentralization and personalization of financial services are major drivers. Finthech investments account for up to 17% of Russian VC market, the interest is strong and fuels growth of local startups, some of them (like payment platforms) becoming international.



### 3. Space trends. Opportunities for science and business



**Drivers:** New space race is evolving with far space exploration: Rosetta, Curiosity, Dawn, etc. Growing number of developing countries' space programs accelerates smaller scale (cheaper) projects. Space 2.0: space privatization by private companies (SpaceX, S3, Virgin, Dauria, etc), disrupting the market of near space travels and delivery. Near space travels and exploitation is turning from science matter into business. Space industry turning into innovation renaissance after years of

stagnation (pace of innovation was/is still slower than in other major industries). Now it only take 9 months to order a space delivery from private companies. State still plays and will play key role as a regulator and customer. But SMEs (startups) will aim and occupy markets of space telecom, navigation, distant earth reconnaissance, small satellites and servicing other space projects.

**Technology trends:** Significant growth of small satellites functionality and diversity; standartization - CubeSat; production cost decrease for small satellites; new approach towards large formations of small satellites with relatively short lifetime, development of cheaper delivery and orbital travel systems, robotics. Technology reverse: tech developed for earth are coming to space.

**Russian outlook:** Concept of Roscosmos technopark in Skolkovo has been finalized. This includes: performing of experimental research work, commercialization of Roscosmos part of ISS for external customers, popularization of soace science and engineering in schools and universities (NASA SSEP example). Creation of infrastructure for development and launch of small spacecrafts, search for commercial customers, quota of free of charge launches for Russian educational and research institutions.



## 4. New technologies in modern manufacturing: trends and challenges



**Drivers:** Computer engineering now determines competitive advantage of a product. Engineering, not manufacturing, generates most of the profits. German Industry 4.0 and widely accepted as future standard. Realization of projects in time and according to budget is one of the biggest challenges to be addressed by digital manufacturing. Theoretically civilization needs a function (service), such as energy, transport, etc but does not need expensive infra elements like power plants, roads, etc, *per se*.

**Technology trends:** Revolutionary improvements in manufacturing logistics. Real time monitoring of product and production lifecycles. Transfer from sales of product to sales of service or function (e.g. working hours for aircraft engines are now sold). Appearance of new, potentially closed, platforms for such service/function marketing and sales. Well known but very laboursome theoretical physics calculation models are now supported with calculation power revolutionize advanced materials industry – appearance of new class of material design companies, complementary to additive production companies. High throughput robotic screening of production models/cycles.

**Russian outlook:** Skoltech report on advanced manufacturing - the best study in Russia <http://foresight-journal.hse.ru/en/2015-9-1/146970447.html>. January 2015 Skoltech launched Product Design and Advanced Manufacturing Ms course with MIT. IBS is leading in Russia as IT solutions provider for manufacturing. In Russia “pure engineering” is very hard to sell as standalone, people used to buy final products and engineering often needs to be encapsulated in the product. Most of AM examples are controlled by state corporations like like Rostech, most examples are military. Russia need consortium of IT companies to promote AM for local industries, especially relevant in shade of sanctions and import substitution initiatives.

## 5. Innovation approaches to defending against cyber threats



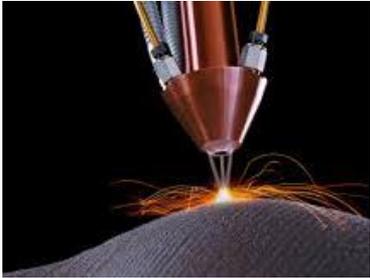
**Drivers:** Ubiquitous penetration of information systems, widespread use of mobile interfaces and payment systems, cyber terrorism threats in industry and infrastructure objects – all these define high demand for breakthrough cyber security solutions. Expected evolution of IoT viruses, attacks on wearables, smart devices and robots, targeted attacks against POS systems. Attacks shift from global (nail viruses, etc) to personal and targeted. Cyber security is arguably the fastest growing segment in IT. Growth exceeds capacity of large players to offer new solutions on the market, M&A with small fresh companies are very common strategy for majors.

### Technology trends:

Plant Control Systems security, SCADA. Cloud security and security as a service. Cyber security analytics. Personal security protection against targeted attacks. Protection for IoT, smart and mobile.

**Russian outlook:** Russia is rather well positioned in the world market of cyber security with strong tech base. Import substitution initiatives and storage of personal data are shifting the market towards local developers. This fires back to yield a number of domestic products that have no international potential. Plant Control Systems security, SCADA solutions for domestic industry is arguably the most the most lucrative future market, in shades of sanctions. IBM and Intel are active players screening for security startups acquisitions in Russia. Numerous solutions for separate security problems are available from many providers, but there is a lack of integrating solutions. Development of cloud security market in Russia (and cloud technologies overall) lag significantly behind developed countries, in large due to new protective legislation prohibiting personal data storage outside the country.

## 6. Laser and Radiation Technologies. Changing Industries and the Quality of Life



**Drivers:** Radiation technologies transfer from nuclear industry and science to other industries, like medical. Medical industry is actually driving development of laser and radiation technologies globally. Currently laser and radiation technologies are required and used in industrial and technological processes as: powerful tools for welding and cutting with a high precision, equipment for coating and changing material properties, tools in mining operations and processing of minerals and many other applications.

**Technology trends:** New applications for lasers: ultra short impulse lasers for processing of delicate materials like biological tissue, fine applications in implants, micro fluidics. Additive technologies are mostly laser based - quantum leap in production technology thanks to lasers. Radiation technology for polymerization to replace chemical synthesis, radiation treatment of crop seeds to eliminate infests and diseases.

**Russian outlook:** In Russia most of the clients are from military related and state controlled industry, regarded as investments in future transfer to civil market. Good prospects due to sanctions (foreign suppliers are sanctioned to deliver to military related industries) and drop of ruble value makes other foreign suppliers non competitive. Two netwoRk initiatives: Laser tech and Radiation tech associations. Statistics from Russian Laser association – in numbers 80% of Russian laser industry companies are SMEs. “IPG photonics” is Russia’s major input to global laser market. A network of laser and radiation technology centers built with public funding yet far from paying off investments due to little demand from domestic industry to switch to hi-end production technologies. Very little investors interest in hardware, projects mainly realized in partnership with larger players from industry of public institutions.



**Drivers:** Competition between traditional mass media and Internet media. Serious choice to make in the next 3–5 years: develop as a hi-tech service companies focused on end users or to earn from granting access to the infrastructure (with a smaller margin). New technologies, network coverage, new communication services, etc., now reduced to the idea that without constant communication/connection the quality of life is limited.

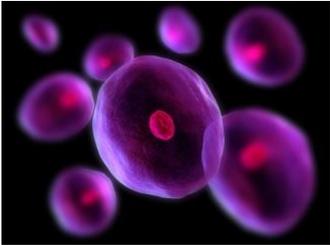
### **Technology trends:**

Transformation of business models in broadcasting and distributions of content, technology convergence, evolution of new media professionals (i.e. video content cutting). Short-form (under 20 minutes' duration) online video segment is growing fast with expected revenues of \$5 billion per year in 2015 and beyond.

### **Russian outlook:**

Federal project for Russia transition to digital TV (DVB-T2) is coming to an end. Digital TV is already accessed by over 90% of Russians. Online video content segment is steadily growing, yet is still very small. 80% of population watch 20 federal (Moscow) channels, 12% also watch cable and sat TV, the rest 8% watch all other video formats (VoD, time-shifting, YouTube, etc). Paid video content segment demonstrates good growth dynamics. Generally Russia follows the footsteps of developed countries.

## 8. Cell Technologies and Regenerative Medicine



**Drivers:** Expansion of national immunization schedule stimulates vaccine and biotech market development. Switch from last mile treatment to preventive medicine dictates development of cell technologies based diagnostics. Fast growth in surgeries involving biocompatible and biodegradable implants. Fast growth in bioinformatics market and big data analysis and capacities.

**Technology trends:** Genetic engineering, construction of functional active structures and their incorporation in human body and genome. Bio-printing of cell cultures and tissues. Design of cell cultures for biotechnological synthesis of pharmaceuticals.

**Russian outlook:** So far no regulation exists in Russia for cell technologies, this shall be changed from January 2016 when a new law on “biomedical cell products” shall come into force. The law regulates all types of R&D related to human cells, with a range of definitions for cell lines, biomedical cell product, cell donor, etc made legally for the first time in Russia. Intensive development of agricultural market in Russia creates demand for immunobiological products. Import substitution policy in pharmacy (production of antibiotics, hormones), industrial biotechnologies (enzymes), agro-industry (additives, vaccines, antibiotics) and cost increase for imported products drives for production localization inside the country.

## 9. Surgery of the future: robotics and virtual reality



### **Drivers:**

Development of robotics, growing IT penetration in medicine, integration of a doctor, patient and insurance company. Development of early diagnostics and detection methods encourages low invasive operations, faster patients recovery and improved survival rate are crucial for medical insurance industry and public healthcare. Move away from “last mile” treatment to earlier and less harmful surgery. 42 companies developing analogues of Da Vinci surgery robot and next generation robots.

### **Technology trends:**

Automation of clinical processes, distant management of geographically remote medical units, MRT-guided non-invasive surgery, parallel robotics platforms in surgery, computer simulated surgery.

### **Russian outlook:**

Country-wide implementation of telemedicine and IT systems in clinical management. There are 22 Da Vinci surgery robot complexes currently installed in Russia. Next generation surgery robotic developed by Skolkovo resident company “Biomedtechnologies” with expertise from doctor Pushkar – international level robotic surgeon (currently operating on Da Vinci). Finland is declared as a partner country in the project, future robot co-development is foreseen in Oulu and Helsinki.



## 10. CHALLENGES IN CANCER CONTROL



**Drivers:** Global scientific, medical and public efforts aimed at cancer control, reduction of death rate and oncology budget spendings. According to WHO, number of cancer cases detected annually has grown from 12,7 to 14,1 mln and death rate from 7,6 to 8,2 mln cases. The numbers expected to grow on 70% by 2030. Current healthcare and treatment models are very cost inefficient, the challenge is expected to be solved by personalized care. Antitumor drugs are in top in pharma investment and FDA list of new drugs registered annually.

**Technology trends:** Development of accessible early stage, fast and inexpensive molecular diagnostics and other diagnostic methods. Personalized cancer treatment. Tumor preventing medication. Improvements in patients routing along cancer treatment process.

### **Russian outlook:**

Development of public program of country wide population screening for early cancer detection. Periodic health examination subprogram has already started in 2013 with public investment of 1,8 bln euro. In course of the program 27000 oncology cases were detected in 2013 and 14000 in the first 6 months of 2014. Creation of oncology departments in clinics, 39% still lack oncology cabinets. Development of palliative medicine and amendments in the law controlling “narcotic substances and psycho-active drugs” and especially concerning orphanic drugs. Russia hasn't been bringing new cancer drugs on the market since USSR but now there are several candidates in portfolio of local VC investors. ChemRAR and Skolkovo jointly develop the center for in silico and chemical high throughput screening center for drugs – unique in Russia.



**Drivers:** In Russia – falling demand in residential property market dictates innovation to attract new buyers, very high energy intensity of Russian cities, poor transport infrastructure and modern city governments competing to offer better living conditions. Long term trend in energy cost increase (in 10-20 years perspective) coupled with availability of new affordable technologies and platforms in IT and IoT (Tizen), material science, energy - drive the market.

**Technology trends:** Big data analytics of citizens' actions and profiles, Cloud technologies for citizen to access information and services, Open government and open city tenders platforms, GPON networks, Bio energy utilization and waste recycling.

**Russian outlook:** Smart city is understood by developers as integration of living and residential, business and public space, plus wide application of modern materials and smart resource management based on IT. Legal base and state incentives for private investors to invest and implement smart city solutions is still a problem. Smart city projects in Russia are driven top-down, starting on city scale, but not on individual “smart home” level. Moscow last few years makes significant efforts improving quality of life and city environment with initiatives mainly in ubiquitous telecom connection (wifi, etc) and products/services on its base, investments in social infrastructure products and services (healthcare, education), working with big data coming from citizens, and improvement of transport infrastructure. API Moscow – the city's living lab for smart city startup projects. Car sharing project is starting in Moscow for the first time. In Ufa smart grid project in the city has been launched as city suffers from high energy losses.



Interested to know more?

Tekes

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### Link to video archive:

<https://startupvillage.ru/main/en>

*This material is prepared in cooperation with Skolkovo Foundation*